JULY 1948

American Foundryman

THE FOUNDRYMEN'S *Own* MAGAZINE

SIGNS of the trend...

Here's an 18-second summary on why most foundries use Crown Hill Seacoal Facing for venting molds.

The high volatile content (see Bureau of Mines figures) of Crown Hill means quick flash. Since the fusion point of the small ash residue is 2980° F., molten iron cannot fuse it, and low sulphur content eliminates hard spots. In short, peeling is easy and cleaning costs *come down.* Try Crown Hill, choice of most foundrymen.

FIGURES FROM BUREAU OF MINES
DEPT. OF INTERIOR OF THE U. S.

(Moisture Free)

PROXIMATE ANALYSIS

Volatile Matter (V.C.M.)	3[illegible].9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash . . . 2980°F

THE FEDERAL FOUNDRY SUPPLY COMPANY

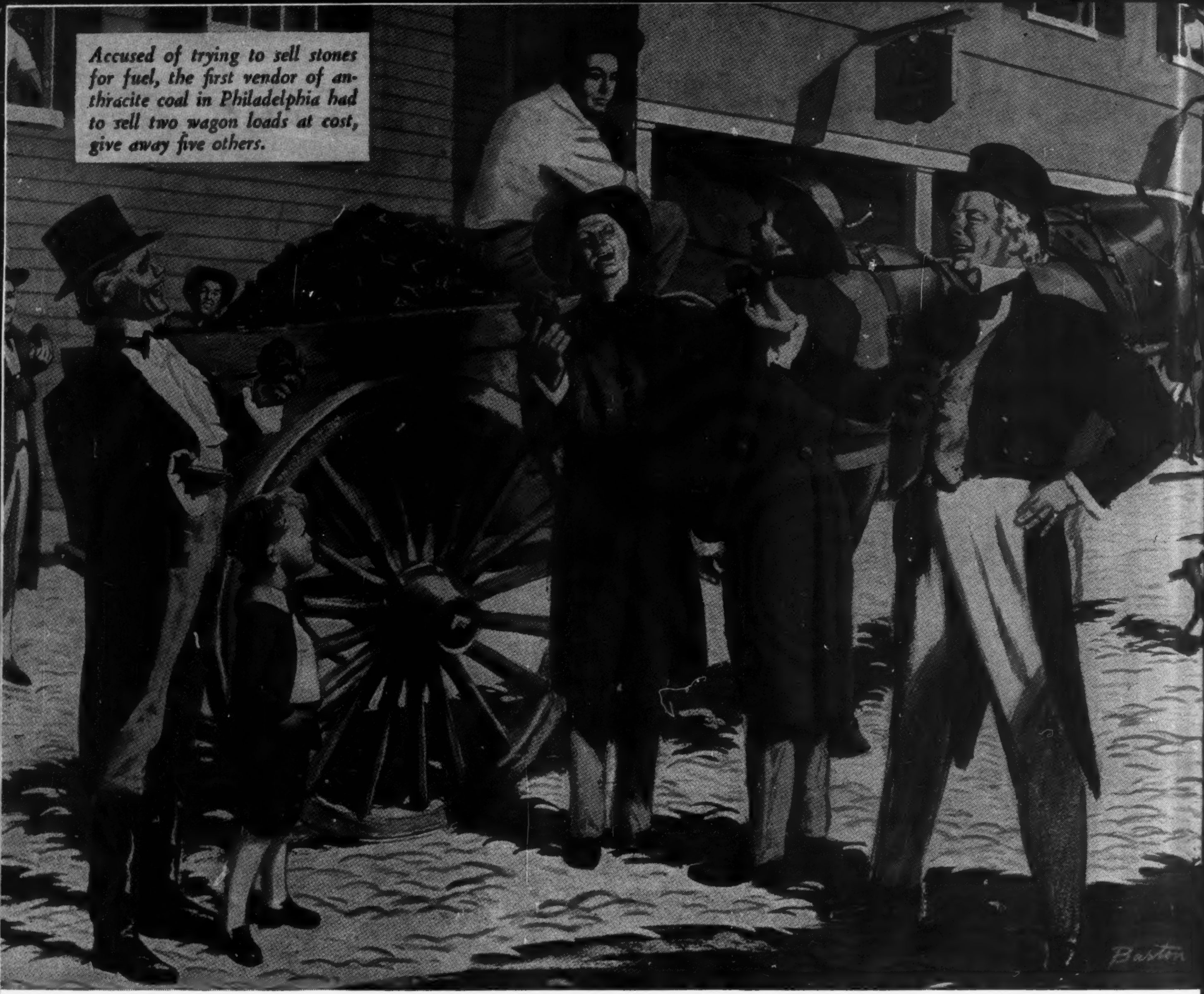
Seacoal Plant
CROWN HILL, W. VA. • CHICAGO
CHATTANOOGA, TENN.

DETROIT • MILWAUKEE
NEW YORK • ST. LOUIS

RICHMOND, VA.
Mines
UPTON, WYO.

IN TWIN CITIES: The Foundry Supply Co., Inc., 404 South Third St., Minneapolis 15, Minn.

**4600 East 71st Street
Cleveland 5, Ohio**



"ANTHRACITE FOR FURNACE FUEL?"

"NEVER!" said the iron makers of 1812

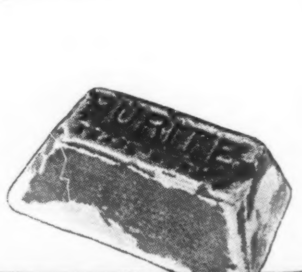
Even with important advantages over charcoal, anthracite needed 28 years for wide acceptance by iron makers. First offered in 1812, it wasn't until 1840 that Dr. Geissenhainer's principle of using anthracite with a hot blast was generally accepted. By 1890, the industry was producing 2,186,411 tons of anthracite iron a year.

In striking similarity was the reception given to PURITE. Placed on the market only 25 years ago, PURITE is now employed in the production of over 10,000,000 tons of castings annually. Here is why:

PURITE forms a sodium slag which is more fluid, more highly basic and of lighter gravity than ordinary cupola slags. This slag not only fluxes the cupola better, resulting in improved melting conditions, but converts particles of slag-oxides entrained in the iron into a liquid form, which frees itself from the molten metal. The result is cleaner iron and better castings.

For the facts on improved quality and lower operating costs, send for details about PURITE. Mathieson Chemical Corporation, 60 East 42nd Street, New York 17, N. Y.

Mathieson
PURITE
Purite (Fused Soda Ash) . . . Liquid Chlorine
Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua
Sodium Chlorite Products . . . Chlorine Dioxide
HTH Products . . Dry Ice . . . Carbonic Gas
Sodium Methylate



PURITE is commercially pure soda ash containing over 98% sodium carbonate, fused and cast into convenient 2-lb. pigs. Its desulfurizing and refining action are traceable to the chemistry of soda ash.

VOLUME XIV, NUMBER 1

American Foundryman

July, 1948

Official publication of American Foundrymen's Society

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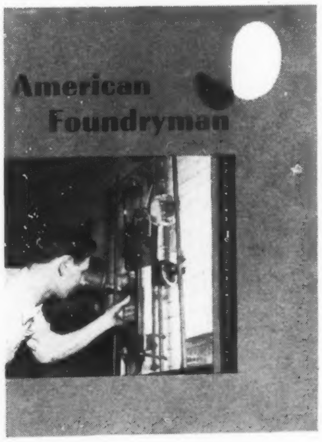
The American Foundrymen's Society is not responsible for statements or opinions advanced by authors of papers printed in its publication.



This Month's Cover

Carbon is an important constituent of all ferrous alloys and its control is a basic step in foundry process control. Standard method of determining carbon for many years was to burn a sample in a stream of oxygen, catch the carbon dioxide, and weigh. Recently the volumetric measurement of carbon dioxide, illustrated on the cover by a photograph made in the laboratory of Pettibone Mulliken Corp., Chicago, has increased in popularity. Determination of carbon in sand is recommended in "Develop Chemical Methods for Faster Sand Analysis," pages 50-56 of this issue.

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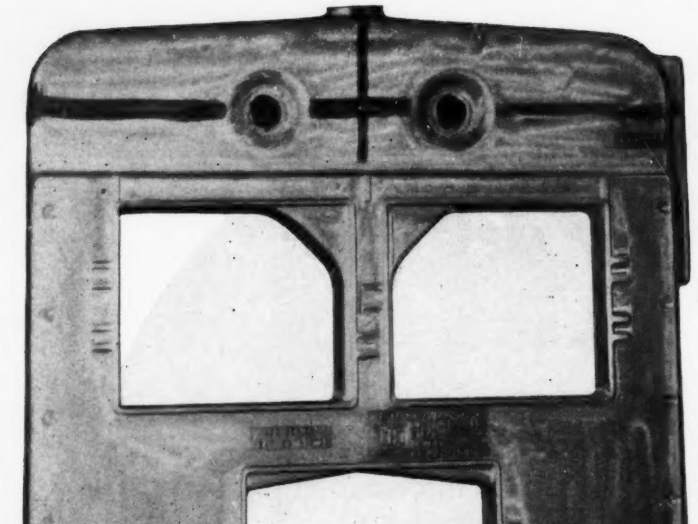
Sincerityi
Thiem
YOUR THIEM REPRESENTATIVE



ENGINEERS and MANUFACTURERS of PERMANENT-MOLDS, WOOD and HIGH PRODUCTION METAL PATTERNS

All metal patterns of the high production type are carefully machined to a fine tolerance and guarantee a perfect reproduction, saving time and money. Quality and precision are ever the watchwords of experienced pattern engineers throughout the plant.

Working out intricate detail of a high production Metal Pattern for a steam boiler section—heavy duty type.

WOOD AND METAL PATTERNS • PERMANENT MOLDS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY • BRASS, BRONZE AND ALUMINUM CASTINGS

CITY PATTERN
FOUNDRY AND MACHINE CO.

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IF YOU WANT BETTER CASTINGS . . .
Control SAND - CORES - MOLDS
SAND
SAND RAMMER accurately reproduces the ramming of specimens to be tested for permeability, strength, density and flowability.
SAND STRENGTH MACHINE determines green or dry compression and shear strength of sand—also deformation to determine plastic strength. It is either indicating or recording.
MOISTURE TELLER an instrument for either plant or laboratory which flash-dries sand samples for accurate moisture determination.
PERMMETER quickly and precisely determines the A.F.A. standard permeability of all molding materials. A direct reading unit.
CORES
CORE PERMEABILITY TUBE is used with the Permmeter to determine the A.F.A. Permeability of baked cores and dried specimens.
GAS DETERMINATOR measures volume of gas released by any core or molding sand mixture—used also to check baking practice.
BAKING OVEN provides accurate control of core baking for core research and binder testing.
TENSILE CORE STRENGTH ACCESSORY attached to the Sand Strength machine determines tensile strength of baked core specimens.
MOLDS
CORE HARDNESS TESTER measures surface hardness of baked cores and dry sand molds.
MOLD HARDNESS TESTER determines hardness of green sand molds or green cores—also compressive strength of mold surface in psi.
DILATOMETER: a complete high temperature testing laboratory. Predicts behavior of sand and core during pouring, solidification and shakeout.
2951
CONTROL
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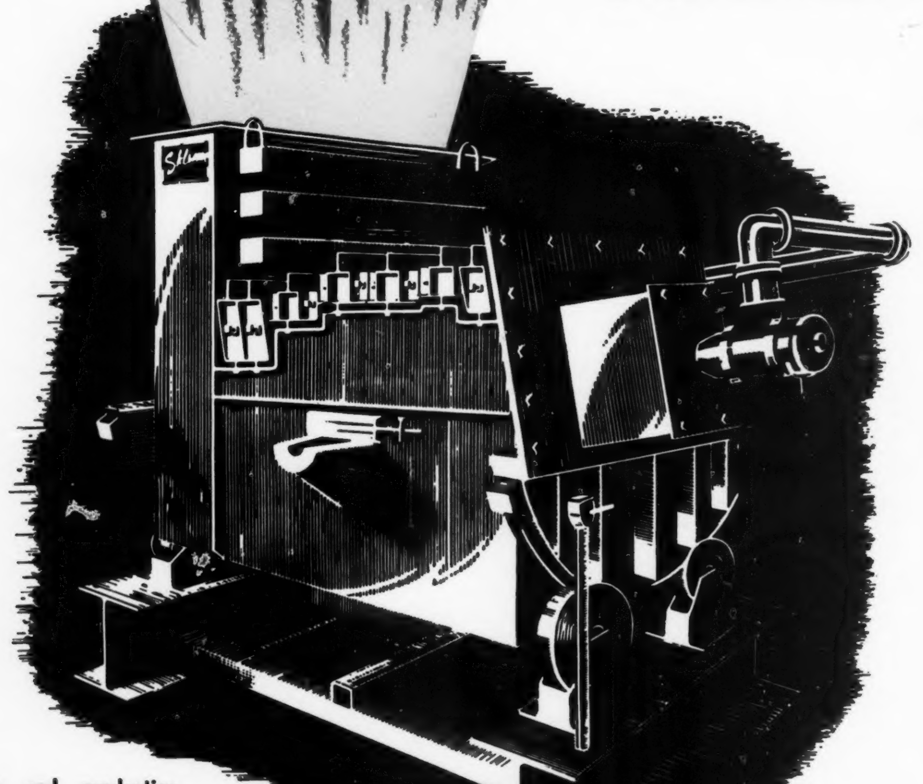
9330 ROSELAWN AVE., DETROIT 4, MICHIGAN
SAND • MOLD • MOISTURE • SULFUR • CARBON

THE ORIGINAL

Sklenar ...

NEW IMPROVED REVERBERATORY FURNACES

The Modern Method of Melting Metals



All specifications and production under the supervision of the inventor, W. F. Sklenar, F.F.Sc., M.E. Technical Director

Patented, Patent Pending and Patents Applied for

SKLENAR FURNACE

A Subsidiary of

EXPORT OFFICE: Indianapolis Machinery Export Co.,

3 8 M E M O R I A L   D R I V E

... Maintenance Economy means

COMPARISON OF COSTS
(RED BRASS)

	SKLENAR	COST	CRUCIBLE TILT	COST
Total weight melted	259,270 lbs.		259,270 lbs.	
Number of heats	432			
Total hours labor (maint.)	26	26.52	64	65.28
Number Crucibles used (#120)			8	176.00
Fire brick	78	15.60		
Cement used	100 lbs.	8.90	400 lbs.	35.60
Fire clay used	400 lbs.	12.00	600 lbs.	18.00
Total hours labor daily for preparation	None		172 hrs.	175.44
Time of heats for melt	17 min. (600 lbs.)		40-50 min. (360 lbs)	
Total Maintenance Cost		$63.02		$470.32

GREATER PROFITS

Alert foundrymen find the NEW IMPROVED SKLENAR REVERBERATORY FURNACE a boon in reducing melting costs . . . in increasing production of superior metals. The SKLENAR is the ONLY furnace that gives perfect combustion . . . perfect atmosphere control. Maintenance costs minimized; producible tonnage maximized. Write for our descriptive circular A-1 for complete details and specifications.

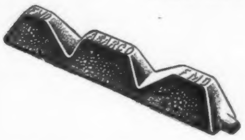
AND MANUFACTURING CO., INC.

WILSON INDUSTRIES, INC.
44 Whitehall St., New York 4, N. Y.

C A M B R I D G E , 42 , M A S S .

JMLco F-GG1f

HANDLES — WITH CARE!



Casting aluminum drawer handles for file cabinets is a ticklish job. For its success an upstate New York foundryman needed an alloy with special properties of strength and ductility.

The foundry sought Federated's help. "We cannot recommend an existing alloy that will successfully fill the specifications" was the verdict of Federated's metallurgists. *BUT* they went further. They studied, made many tests, and finally produced a new alloy that did the job and did it right.

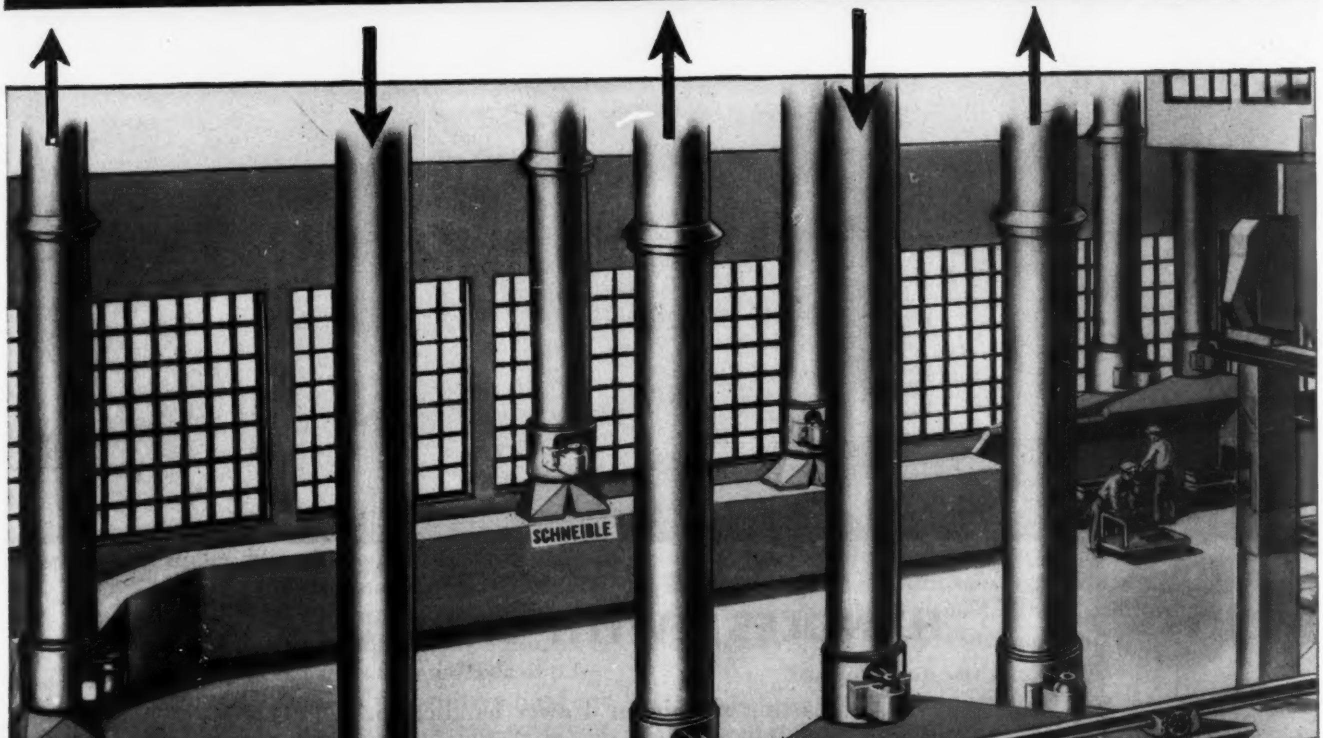
This same metallurgical service is available to you. Practical field engineers and a complete research laboratory are at your command.

See Federated for the first in service and the first in products—brasses, bronzes, aluminum alloys, babbitts, solders, type metals and other non-ferrous products.

Federated METALS

Division of American Smelting and Refining Company, 120 Broadway, New York 5, N. Y.

New "Open Side" Mold *features*



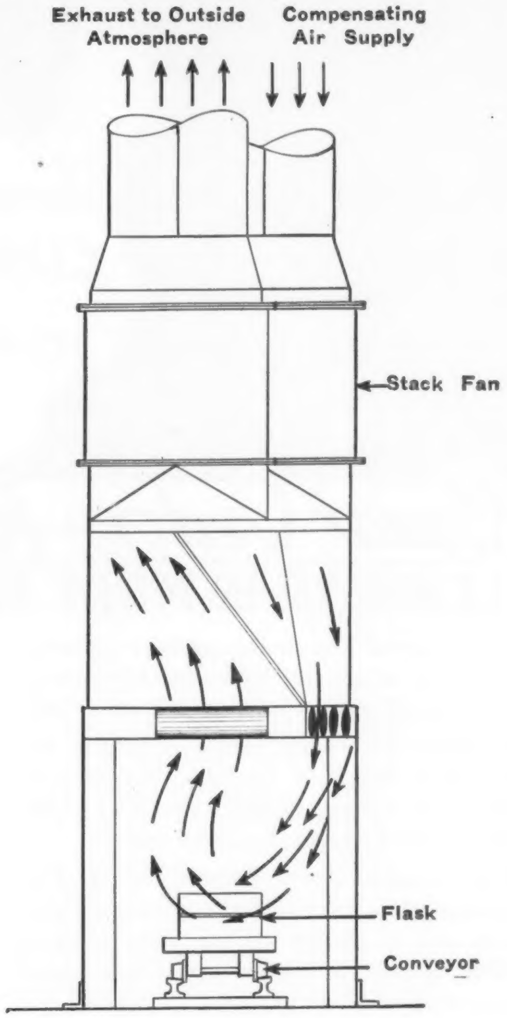
Cooling Conveyor Hood

Compensating Air Principle

Now, for the first time Schneible has made available to the foundry industry a hood for mold cooling conveyors which alone offers these advantages:

1. Has open side for observation of molds in transit to weight removal station. Easy removal of spillage—easier conveyor maintenance.
2. Protected by compensating air stream on open side of hood—smoke and heat prevented from contaminating foundry atmosphere.
3. Smoke and heat continuously exhausted through stacks.
4. Lower in height than standard hoods resulting in better visibility and ready accessibility.

The Schneible "Open Side" Hood has a divided plenum chamber with a steady stream of air taken from above the roof line (can be taken from below roof in summer) blanketing the cooling molds. This compensating air supply sweeps the hot molds on the conveyor and all smoke is literally blown into the exhaust portion of the plenum chamber. This section of the hood has adjustable louvers. Only a small amount of make-up air is taken from the foundry. It's 1, 2, 3, fresh air in—smoke out! Mold cooling enclosures for large molds can be designed *without any* side walls. Weight and clamp removal stations can also be ventilated by Schneible Hoods with compensating Air Supply—better working conditions—more comfort for workers. Send for further details on this remarkable addition to the Schneible Line of Dust Control and Ventilation Equipment for Foundries.



Manufacturer's Association, Inc. Foundry Equipment

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SCHNEIBLE

LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT *for* DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

THAT MAN IS A FOUNDRYMAN!

A FOUNDRYMAN! That man is a foundryman! What a simple statement and yet what significance it has for those familiar with the foundry industry.

To most laymen and, unfortunately, to many engineers, a foundryman is just—a foundryman. And a casting is only a casting.

What would the average layman, metallurgist, or engineer think if he were suddenly placed among the exhibits in Convention Hall at Philadelphia last May? What would pass through his mind while sitting in a crowded room with several hundred earnest foundrymen attentively listening to a speaker talking on one of the multitude of technical problems connected with the castings industry? And following that, hear the discussion and arguments after such a talk?

The layman might believe he was in a foreign country with a strange language. The average engineer would no doubt complain that his handbook must be incomplete as not much of the equipment he had seen and little of the talk he had heard, can be found in the handbooks he has on his drafting table. The manufacturing plant metallurgist might wonder if all of this is necessary to produce castings to the specifications he demands.

The A.F.S. Foundry Show is an exhibit which can be properly housed in only three or four cities in the entire country because of convention hall limitations. Men of the foundry industry attend the technical sessions and visit the exhibits in such numbers as to tax existing hotel capacity to the limit. All of this is by and for—foundrymen!

Within recent years there has been a definite tendency on the part of the foundry industry to lead some other industries in research and development, in educational programs among the young men of the engineering colleges and secondary schools, in safety and hygiene, in quality control, and in capacity to produce.

Our task as members of the American Foundrymen's Society is not only to increase our own knowledge of the science of founding metals, but also to broadcast our aims, ambitions, and accomplishments.

Foundries and foundrymen make up an outstanding industry! You, as a foundryman, know this to be a fact. Leading foundries, foundrymen, and foundry societies, like A.F.S., have already taken constructive steps toward promoting the industry, and advancing its standing in the minds of the men of other industries and professions with whom we deal.

What are **you** doing for the foundry industry?

Edwin W. Horlebein

EDWIN W. HORLEBEIN
Vice-President Elect
AMERICAN FOUNDRYMEN'S SOCIETY

Edwin W. Horlebein, vice-president elect of the American Foundrymen's Society, has been a member of the Society's Board of Directors since 1945, and has served on the Executive Committee of the Brass and Bronze Division. He was the first chairman of the Society's Chesapeake Chapter. A native of Baltimore, he has been president of Gibson & Kirk since 1924, and prior to that was an engineer with the Dixie Manufacturing Co., Baltimore. He began his career as a machinist's apprentice on the Baltimore & Ohio Railroad.

St. Louis will be host to the 1949 convention of the American Foundrymen's Society. Called the "City Surrounded by the United States," St. Louis is an ideal choice for the non-exhibit 53rd Annual Foundry Congress, not only because of its accessibility from all parts of the country, but because the city and its people reflect the habits and customs of all America—the hospitality of the South, the West's pioneering spirit, the robustness of the North, and the aggressiveness of the East.

A city that has been under three flags in its 184 years—those of France, Spain and the United States, St. Louis is rich in historical and cultural tradition.

A. F. S. 1949 CONVENTION

Imposing buildings near St. Louis' Memorial Plaza

St. Louis waterfront scene on the Mississippi

According to *Fortune,* "St. Louis was listening to opera when Chicago was a mud flat and Detroit was a forest." Today, the St. Louis Municipal Opera has the largest outdoor stage in the world and is world famous for the quality of performances presented during its 22 summers.

Forest Park, the pride of the "City of a Thousand Sights," is the second largest public park in America and contains within its 1,380 acres one of the finest zoos in the world, three golf links, tennis courts, baseball diamonds, and soccer fields.

The Mississippi River has played a vital role in the development of St. Louis. Today modern counterparts of the famous Mississippi River steamboats, carrying gay parties of excursionists vie for the right-of-way with commercial craft from 20 states on the Great-Lakes-to-Gulf Waterway.

Proud as the people of St. Louis are over their historical and cultural background, and their city of parks, shaded streets and beautiful homes, they are not content to rest on their civic laurels. St. Louis ranks ninth among all U. S. cities in the value of its manufactured products. No small part of this total is attributable to the city's metals industries, including its foundries, who were making castings for the city's own railroad as far back as the 1850's.

Today, some 25 railroads, several airlines, and improved state and national highways make St. Louis, easily accessible from all parts of the country, one of the leading convention cities of the United States. Much of St. Louis' famed hospitality is due to the city's organized, personal Convention Service, which places all the facilities of this city of more than a million inhabitants at the disposal of the American Foundrymen's Society. Your hosts, members of the St. Louis Chapter, on behalf of the city and its people, say: "Meet Me in St. Louis" in 1949!

AMERICAN FOUNDRYMEN'S SOCIETY

EFFECTIVE JULY 1 the 52-year old American Foundrymen's Association became the American Foundrymen's Society. Changed in accordance with the almost unanimous will of those who voted, the new name is more descriptive of the present functions, aims, and policies of the organization and conforms to the names of other technical societies.

The object of the American Foundrymen's Society *"shall be to advance the arts and sciences relating to the manufacture and utilization of metal castings."* This is a restatement and simplification of the aims of the American Foundrymen's Association.

Some 2223 members, or over 22 per cent of the members in the United States and Canada expressed their opinions, and 2029 voted in favor of changing the name and restating the object of A.F.S. On all other amendments proposed the favorable vote was even larger.

The name change and other amendments were submitted to the membership for vote by letter ballot in a general revision of the By-Laws. Recommended by the By-Laws Committee and approved by the Board of Directors, the newly-adopted revisions were suggested for clarification, to make the By-Laws conform to current organization practice, or to make more definite provision for carrying on Society affairs.

[illegible], Section 1, [illegible] *[illegible]staining membership will qualify [illegible] ersonal membership at minimum annu[illegible] re such individuals reside outside the territor[illegible] Chapter in which such Company or Sustaining membership is held."*

The Article entitled Chapters provides that *"no member of the Society shall be recorded as holding membership in more than one Chapter."* It further provides: *"only Members of the Society in good standing shall be eligible to hold office in any Chapter."* Other changes affecting Chapters require that each Chapter shall be governed by a set of by-laws which has been approved by the Society's Board of Directors and adopted by the Chapter membership.

Technical publications over the name of the Society may not be issued or distributed by any Chapter without the approval of the Publication Committee of the Society. This does not affect presentation of papers at chapter meetings or regional conference, nor distribution of such papers to Chapters or the membership.

"The Chapters shall submit not later than July 15 to the Treasurer of the Society an annual financial report" according to Article XVII, Section 10, which adds *"this report shall be in accordance with the requirements of the Manual for the Conduct of Chapters."*

Research activities, long a major function of the organization, gained added impetus through a new Article which makes definite provision for research activities. The Board of Directors may authorize research on problems of value to the castings industry and may make provisions for financing these activities.

A change in the Board of Awards provides that the Chairman shall be the Senior Past President of the last seven living Past Presidents, who comprise the Board, instead of the Junior Past President.

Future By-Laws amendments will be made by letter ballot sent to all Society members *"in good standing in the United States, Canada, and Mexico,"* the latter having been added in the latest revision.

CHAPTER OFFICERS HOLD FIFTH ANNUAL CONFERENCE

DELEGATES FROM MOST A.F.S. CHAPTERS and representatives of a proposed Kansas City Chapter attended the 5th Annual Chapter Chairman Conference, June 28-30, at the Stevens hotel, Chicago. Chapters not represented were Mexico City and Toledo.

The chapter officials came to Chicago at Society expense to study current Society policy, to learn first hand the plans for 1948-49, and to exchange experiences in handling chapter problems. Limited to chairmen in previous years, this year's conference included vice-chairmen so they will have advantage of two year's participation in the conferences.

Starting with a talk "Know Your A.F.S." by President-Elect W. B. Wallis, the agenda included 17 items. After opening the conference and calling for 'round-the-table introductions, Conference Chairman E. W. Horlebein turned the meeting over to Mr. Wallis who outlined the development and organization of the Society and explained its position in the foundry industry as a technical organization.

Technical activities of A.F.S. were outlined by Technical Director S. C. Massari, who explained the operations of the various divisions and committees, the method of setting up research projects, and the handling of technical publications. He pointed out that technical and practical papers of interest to foundrymen are solicited throughout the year.

AMERICAN FOUNDRYMAN and its five major sections organized for maximum service to A.F.S. membership were the subject of a brief talk by Acting Editor H. F. Scobie. He announced plans for further development and improvement of *The Foundrymen's OWN Magazine* and called attention to a new department called The Round Table (see pages 58-59 this issue).

St. Louis Chapter Invites Convention

At the luncheon marking the end of the Monday morning session, A. L. Hunt, chairman of the St. Louis District Chapter which is host to the 1949 Annual Foundry Congress of A.F.S., invited all chapters to send large delegations to the Convention, May 2-5. National Castings Council Secretary F. G. Steinebach announced that the Council is planning a safety and hygiene program in which A.F.S. is expected to play the leading technical role.

The afternoon program consisted of a detailed presentation of newly developed National Office methods for handling membership records and a review of the By-Laws as recently amended by letter ballot. Promotion Manager T. B. Koeller described the punch-card system for promptly handling new memberships, renewals, and changes, and outlined the methods for keeping chapter secretaries and treasurer constantly apprised of changes in status of chapter members.

Secretary-Treasurer Wm. W. Maloney reviewed the main By-Laws revisions and emphasized the change in the name of the organization to American Foundry-

Chairmen of the three A.F.S. Canadian Chapters standing behind their respective vice-chairmen. (Starting left, standing) R. A. Woods, Ontario Chapter; O. L. Voisard, Eastern Canada & Newfoundland; T. Cowden, British Columbia Chapter. In front, left to right, are J. H. King, J. H. Newman, and J. A. Dickson.

W. E. Sicha (standing, left), vice-chairman, Northeastern Ohio Chapter, and A. D. Barczak, chairman, Cincinnati Chapter, examine A.F.S. publication over the shoulder of Chairman G. Frank Anderson of newly-formed Tennessee Chapter.

West Coast chapter officers (seated, left to right) Oregon Chapter Secretary-Treasurer G. C. Vann; Washington Chapter Chairman G. Rauen, and Vice-Chairman F. R. Young; (standing, left to right) Southern California Chairman L. O. Hofstetter, and Vice-Chairman E. D. Shomaker; British Columbia Chairman T. Cowden; Chairman and Director G. McDonald and J. Russo, Northern California; and British Columbia Vice-Chairman J. A. Dickson.

men's Society (see page 25). Chapter officers expect to be called on to interpret the new By-Laws during the coming year.

High point of the banquet ending the first day of activity was the talk "How's Your Sense of Humor?" by Professor E. A. McFaul, Northwestern University.

The second morning of the three day meeting was given over to a chapter operations panel. During this session, Conference Chairman Horlebein selected discussion leaders from the floor for each of the seven subjects covered. After presentation of the initial phase of each subject delegates offered advice and comment based on experience in their chapters. The seven panel subjects were: chapter program building, management meetings, national officer visitations, membership activities, nominations and elections, chapter-by-laws, and chapter finances.

At the buffet luncheon on Tuesday, G. K. Dreher, executive director, Foundry Educational Foundation, cited the progress made by the Foundation and outlined the fields of activity expected to be covered by FEF and by the A.F.S. Educational Division. The fields were the subject of considerable discussion at a recent meeting of the Educational Division (page 30).

F. G. Sefing, chairman of the Educational Division and an A.F.S. representative on FEF spoke at the afternoon session. He gave a resumé of A.F.S. activities in colleges, trade schools, and high schools, and discussed integration of the National Educational Program with chapter educational activities. "The Shake Out," an open forum for bringing out any thoughts developed

Getting tips on starting an A.F.S. chapter are J. T. Westwood (left) and C. W. Culbertson, representatives of the proposed Kansas City Chapter. Advisors are St. Louis District Chapter Chairman A. L. Hunt and Northern California Chapter Director J. R. Russo.

Discussing chapter operations are (left to right): Northwestern Pennsylvania Chapter Vice-Chairman J. A. Shuffstall; E. H. Taylor, chairman, Canton District Chapter; C. L. Lane, chairman, Philadelphia Chapter; Timberline Chapter Chairman J. L. Higson; and Northwestern Pennsylvania Chairman J. S. Hornstein.

during the Conference or questions not answered, ended the Tuesday afternoon session. This period during which delegates speak frankly and sometimes quite critically is part of every Conference, is always interesting and always provokes new ideas.

Fine points of arranging and conducting chapter meetings were brought out in the Wednesday morning session led by Harold F. W. Hauslein of Harold Hauslein & Associates, Chicago. Mr. Hauslein called on his long experience in training sales personnel to explain such points as: courtesies to the guest speaker, meeting room and speakers' table setup, program arrangement, microphone technique, inducing technical discussion, and introductory speeches.

The latter part of the session was devoted to two-minute talks by volunteers from the floor. Speaking on a subject of his own selection, each volunteer was followed by Mr. Hauslein who brought out the good points of the speaker and offered constructive criticism.

The Conference ended with a luncheon. The complete list of delegates, guests, and conference leaders, who participated in the Fifth Annual Chapter Chairman Conference is given below.

37 Chapters Represented

Conference Chairman—A.F.S. Vice-President-Elect E. W. Horlebein, president, Gibson & Kirk Co., Baltimore, Md.

President-Elect—W. B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh.

Guest Speakers—F. G. Sefing, metallurgist, International Nickel Co., New York; Professor E. A. McFaul, Northwestern University; and Harold F. W. Hauslein, Harold F. W. Hauslein & Associates, engineers and contractors, Chicago.

Guests—National Director Bruce L. Simpson, president, National Engineering Co., Chicago; G. K. Dreher, executive director, Foundry Educational Foundation, Cleveland; Professor R. E. Kennedy, Navy Pier Branch, University of Illinois, Chicago; and F. G. Steinebach, Penton Publishing Co., Cleveland.

Representatives of Proposed Kansas City Chapter—C. W. Culbertson, sales engineer, M. W. Warren Coke Co., chairman of the steering committee; and J. T. Westwood, president Blue Valley Co., both of Kansas City, Mo.

Chesapeake Chapter Chairman B. M. Loring receiving his identification badge from A.F.S. office worker.

Just before the banquet (front row, left to right) Chairman A. L. Hunt of the St. Louis District Chapter which is host to the 1949 Convention; Central Indiana Chapter Vice-Chairman H. L. Creps; C. W. Culbertson, chairman, steering committee, proposed Kansas City Chapter; (standing, starting left) Wisconsin Vice-Chairman and Chairman A. C. Haack and R. C. Woodward; St. Louis District Vice-Chairman G. Shepherd; and Central Indiana Chairman R. W. Langsenkamp.

Birmingham—Director J. A. Bowers, melting supt., American Cast Iron Pipe Co., Birmingham, Ala.

British Columbia—Chairman T. Cowden, gen. mgr., Wm. McPhail & Sons (Can.) Ltd., Vancouver, B.C., and Vice-Chairman J. A. Dickson, owner, Dickson Fdry. Co., Vancouver, B.C.

Canton District—Chairman E. H. Taylor, plant engr., F. E. Myers & Bros. Co., Ashland, Ohio.

Central Illinois—Chairman F. W. Shipley, fdry. mgr., Caterpillar Tractor Co., Peoria, Ill., and Vice-Chairman C. W. Bucklar, supt., Superior Fdry. Co., E. Peoria, Ill.

Central Indiana—Chairman R. Langsenkamp, secy., Lansenkamp-Wheeler Brass Works Indianapolis and Vice-Chairman H. L. Creps, res. sales mgr., Frank Fdry. Corp., Muncie, Ind.

Central Michigan—Chairman C. C. Sigerfoos, asst. prof. mech. eng., Michigan State College, E. Lansing, Mich., and Vice-Chairman F. Coghlin, met., Albion Malleable Iron Co.

Central New York—Chairman C. M. Fletcher, supt., Fairbanks Co., Endicott, N.Y., and Vice-Chairman J. F. Livingston, asst. plant mgr., Crouse-Hinds Co., Syracuse, N.Y.

Central Ohio—Chairman F. W. Fuller, field engr., National Engineering Co., Westerville, Ohio, and Vice-Chairman W. L. Deutsch, sales engr., Columbus Malleable Iron Co.

Chesapeake—Chairman B. M. Loring, head, non-ferrous sec., U. S. Naval Research Lab., Bellevue, Washington, D.C., and Vice-Chairman J. B. Mentzer, secy.-treas., Wood Embley Brass Co., Waynesboro, Pa.

Chairman—C. K. Faunt, works mgr., Christensen & Olsen Co., Chicago, and Vice-Chairman W. D. McMillan, met., International Harvester Co., Chicago.

Cincinnati—Chairman A. D. Barczak, vice-pres., The Bardes Forge & Fdry. Co., Cincinnati, and Vice-Chairman A. J. Smith, met., Lunkenheimer Co., Cincinnati.

Detroit—Chairman A. W. Stolzenburg, Aluminum Co. of America, Detroit, and Secretary J. N. Phelps, Vanadium Corp. of America, Detroit.

Eastern Canada & Newfoundland—Chairman O. L. Voisard, gen. supt., The Robert Michell Co., Ltd., St. Laurent, Que., Canada, and Vice-Chairman J. H. Newman, mgr., Newman Fdry. Supply Co., Ltd., Montreal, Que., Canada.

Eastern New York—Chairman A. C. Andrew, fdry. foreman, American Locomotive Co., Schenectady, N.Y., and Vice-Chairman K. F. Echard, met., Eddy Valve Co., Waterford.

Metropolitan—Chairman J. A. Bukowski, met., Worthington Pump & Machinery Corp., Harrison, N.J.

Michiana—Chairman K. A. Nelson, br. mgr., Chicago Hardware Fdry. Co., Elkhart, Ind.

Northeastern Ohio—Chairman E. C. Zirzow, core room foreman, National Malleable & Steel Castings Co., Cleveland, and Vice-Chairman W. E. Sicha, met., Aluminum Co. of America, Cleveland.

(Continued on Page 30)

REPORT PROGRESS AND PLAN FUTURE WORK AT TECHNICAL CORRELATION COMMITTEE MEETING

MEETING IN CHICAGO on June 18, the Technical Correlation Committee, technical policy making body of the American Foundrymen's Society, heard the annual reports of division and general interest committee chairmen and took action on six proposals. National Director and Past President S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis, chairman of the Committee, and Technical Director S. C. Massari, presided at the meeting.

The Technical Correlation Committee discussed and approved the following new business:

1. Question and Answer Department for AMERICAN FOUNDRYMAN: National Headquarters will request each division chairman to appoint a consulting panel to answer technical questions received at Headquarters. Selected questions and answers subsequently will be published in AMERICAN FOUNDRYMAN with the consultant's name or anonymously as he wishes.

2. Glossary of Foundry Terms: A Committee on Glossary of Foundry Terms is to be formed from the various divisions to make the glossary now in preparation comprehensive and inclusive of all branches of the foundry industry.

3. Plaster Mold Casting: The Committee approved formation, preferably as a subcommittee of the Committee on Precision Investment Casting, of a committee to study plaster mold casting.

4. Committee Membership: It was agreed that a committee member who does not attend committee meetings nor answer committee correspondence for one year should be dropped from the committee roster. National Headquarters will request committee chairmen to contact members of their committees at the end of each fiscal year to ascertain whether or not they wish to serve for the following year. Committee acceptance cards will not be sent to present committee members but only to new members.

5. Author's Offer-of-paper Form: When reprinted, in addition to the information already contained, the following question is to be included: "Do you have authorization and approval from your management to publish this paper?"

6. Short Training Courses: Unanimous approval was given to the plan for the development of short intensive practical courses to be offered under A.F.S. sponsorship at a university having appropriate facilities. Courses are expected to be on practical subjects and lecturers are to be invited from industry. This matter will be presented at the next meeting of the Board of Directors for final approval.

One of the highlights of the meeting was included in the report of the Aluminum and Magnesium Division which already has promises of 14 papers for possible presentation at the 1949 Convention to be held in St. Louis, May 2-5. Present at the meeting in addition to those pictured below were A.F.S. Secretary-Treasurer Wm. W. Maloney and Headquarters Staff members J. E. Foster and P. D. Johnson.

Afternoon session of the Technical Correlation Committee meeting, June 18, LaSalle Hotel, Chicago, (clockwise, starting left) James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.; R. G. McElwee, Vanadium Corp. of America, Detroit; A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee; R. J. Fisher, Falk Corp., Milwaukee; G. P. Halliwell, H. Kramer & Co, Chicago; L. H. Hahn, Sivyer Steel Castings Co., Chicago; A. W. Gregg, Whiting Corp., Harvey, Ill.; J. E. Foster, A.F.S. Technical Staff; Technical Director S. C. Massari; Technical Correlation Committee Chairman S. V. Wood, Minneapolis Electric Steel Castings Co., Minneapolis; Walter Bonsack, Apex Smelting Co., Cleveland; H. Ries, former head of geology department, Cornell University; K. J. Jacobson, Griffin Wheel Co., Chicago; W. W. Edens, Badger Brass & Aluminum Foundry, Milwaukee; Charles Locke of the Armour Research Foundation, Chicago.

HOLD EDUCATIONAL DIVISION EXECUTIVE MEETING

The Executive Committee of the Educational Division met June 8 in Cleveland to hear committee reports and make plans for 1948-49 educational activities.

Division Chairman F. G. Sefing, International Nickel Co., New York, opened the meeting with a summary of the common goal of A.F.S. and the Foundry Educational Foundation, both working to satisfy the need for supervisory, technical, and managerial talent required by the industry and to promote its general welfare in the universities of the country.

An important phase of foundry education brought out in committee discussion involves chapter educational committees which are expected to acquaint secondary school teachers and students with the opportunities in the foundry industry by fostering personal contact between them and the industry. P. D. Johnson, A.F.S. educational assistant, will spend considerable time during 1948-49 contacting chapter educational committees and assisting them with local educational programs.

Theme for the educational program at the 1949 Convention in St. Louis is "In-Plant Training for the Graduates of Secondary Schools." Program and Papers Committee Chairman A. W. Gregg, Whiting Corp., Harvey, Ill., has started looking for authors familiar with the problems of the director in vocational guidance work concerning secondary school graduates and the foundry industry.

Apprentice Contest Committee Chairman R. W. Schroeder, University of Illinois, Navy Pier Branch, Chicago, announced that blueprints and patterns for the 1949 contest will be ready for distribution early in October. A separate set of prints and patterns for Canadian contestants is expected to eliminate routing difficulties which have sometimes prevented holding local contests at the time originally scheduled.

Professor W. H. Ruten, Polytechnic Institute of Brooklyn, reported, as chairman of the Apprentice Training Committee, that *"A.F.S. Apprentice Training Course Outline for Foundry Apprentices"* and *"A.F.S. Apprentice Training Standards for the Foundry Industry"* are ready for publication. The final draft of the list of college research projects will be completed soon, according to Research Projects Committee Chairman R. Schneidewind of the University of Michigan.

In discussing the activities of the Foreman Training Committee and the Graduate Industrial Training Committee it was brought out that these groups might well participate in a proposed summer short course for in-plant training. This course, awaiting approval of the Board of Directors, is expected to be sponsored by A.F.S. at some university with appropriate facilities and located in a foundry center. The course would be taught by instructors from industry.

Reporting for the Foundry Courses Committee of which he is chairman, Professor M. S. Burton, Cornell University, stated that inquiries from schools requesting assistance in establishing and expanding foundry courses were handled on an individual basis.

Professor G. J. Barker, University of Wisconsin, chairman of the Textbook Committee, announced that the outline for the college text is nearly complete and that the high school text is well along.

In addition to those named, other members of the Educational Division Executive Committee present were: F. C. Cech, Cleveland Trade School; B. D. Claffey, Acme Aluminum Alloys Inc., Dayton, Ohio, chairman, Youth Encouragement Committee; G. K. Dreher, Foundry Educational Foundation, Cleveland, chairman, Foundry Talks Committee; W. G. Gude, Penton Publishing Co.; Professor P. E. Kyle, Cornell University; and A.F.S. Technical Director S. C. Massari.

Guests at the meeting were three representatives of the U.S. Apprentice Training Service: R. B. Brown, W. J. Moore, and O. R. Poole.

CHAPTER CHAIRMAN CONFERENCE

(Continued from Page 28)

NORTHERN CALIFORNIA—Chairman G. D. McDonald, patt. shop foreman, H. C. Macaulay Fdry. Co., Berkeley, Calif., and Director J. R. Russo, vice-pres., General Fdry. Service Corp.

NORTHERN ILLINOIS & SOUTHERN WISCONSIN—Chairman H. J. Bauman, fdry. supt., Ebaloy Foundries, Inc., Rockford, Ill., and Vice-Chairman L. C. Fill, fdry. supt., Geo. D. Roper Corp.

NORTHWESTERN PENNSYLVANIA—Chairman J. S. Hornstein, secy., Meadville Malleable Iron Co., Meadville, Pa., and Vice-Chairman J. A. Shuffstall, asst. plant mgr., National Erie Co., Erie, Pa.

ONTARIO—Chairman R. A. Woods, mgr., Geo. F. Pettinos, Ltd., Hamilton, Ont., Canada, and Vice-Chairman J. H. King, salesman, Werner G. Smith Co., Toronto, Ont., Canada.

OREGON—Secretary-Treasurer G. C. Vann, asst. mgr., N. W. Fdry. & Furnace Co., Portland, Oregon.

PHILADELPHIA—C. L. Lane, met., Florence Pipe Fdry. & Machine Co., Florence, N.J.

QUAD CITY—Vice-Chairman E. P. Closen, frdy. foreman, John Deere Planter Works, Moline, Ill., and secretary-treasurer C. R. Marthens, owner, Marthens Co., Moline, Ill.

ROCHESTER—Chairman M. T. Ganzauge, fdry. supt., General Railway Signal Co., Rochester, N.Y.

SAGINAW VALLEY—Chairman A. E. Sunstedt, vice-pres., & gen mgr., General Fdry. Co., Flint, Mich., and Vice-Chairman L. L. Clark, plant met., Buick Motor Div., Flint, Mich.

ST. LOUIS DISTRICT—Chairman A. L. Hunt, plant supt., National Bearing Div., American Brake Shoe Co., St. Louis, and Vice-Chairman G. W. Shepherd, supt., Duncan Fdry. & Machine Co., Alton, Ill.

SOUTHERN CALIFORNIA—Chairman L. O. Hofstetter, Brumley-Donaldson Co., Los Angeles, Calif., and Vice-Chairman E. D. Shomaker, patt. shop foreman, Kay-Brunner St. Products, Inc., Alhambra, Calif.

TENNESSEE—Chairman G. Frank Anderson, vice-pres. & gen. mgr., Chattanooga Implement & Mfg. Co., Chattanooga, and Director K. L. Landgrebe, supt., Fdry. Div., The Wheland Co.

TEXAS—Chairman Jake Dee, owner, Dee Brass Fdry., Houston, Texas, and Vice-Chairman C. W. Williamson, vice-pres., Trinity Valley Iron & Steel Co., Ft. Worth, Texas.

TIMBERLINE—Chairman J. L. Higson, supt., Western Fdry. Co.

TRI-STATE—Chairman Dale Hall, met., Oklahoma Steel Castings Co., Tulsa, Okla.

TWIN-CITY—Chairman C. C. Hitchcock, vice-pres., R. C. Hitchcock & Sons, Minneapolis.

WASHINGTON—Chairman G. Rauen, Olympic Steel Works, Seattle,, and Secretary F. R. Young, sales engr., E. A. Wilcox Co.

WESTERN MICHIGAN—Chairman W. A. Hallberg, fdry. engr., Lakey Fdry. & Machinery Co., Muskegon, Mich., and Vice-Chairman C. N. Jacobson, prod. mgr., Dake Engine Co., Grand Haven, Mich.

WESTERN NEW YORK—Chairman M. J. O'Brien, asst. work mgr., Symington-Gould Corp., Depew, N.Y., and Vice-Chairman J. R. Wark, sales dept., Queen City Sand & Supply Co.

WISCONSIN—Chairman R. C. Woodward, fdry. supt., Bucyrus-Erie Co., So. Milwaukee, and Vice-Chairman A. C. Haack, 2413 N. 65th St., Wauwatosa, Wis.

Old Timer C. E. Hoyt (left), retired A.F.S. secretary-treasurer, welcomes B. D. Fuller, 84, oldest foundryman to attend, to the 52nd Annual Foundry Congress. Now retired and living in Lakewood, Ohio, Mr. Fuller spent 67 years in the foundry field.

Old Timer Proves "The Foundry Is A Good Place To Work" – For 67 Years

OLD TIMERS OF THE FOUNDRY INDUSTRY, more than 300 of them, from the United States, Canada, Australia, Scotland and Mexico, turned up at the 1948 A.F.A. Foundry Congress to sign the Association's Honor Roll and receive recognition pins for 25 or 50 years of service to the industry. Forty-eight of the veterans received 50-year pins.

To B. D. Fuller, 84, of Lakewood, Ohio, went the honor of being the oldest foundryman to attend the Convention. Now retired, Mr. Fuller served the foundry industry for 67 years. Closely seconding Mr. Fuller's record is that of M. E. Dolan, 81, of Louisville, Ky., retired general foreman who began as an apprentice molder in 1883.

Walter A. Hoffman, 76, of Elizabeth, N.J., was the oldest working foundryman to attend the Convention. Still "in harness" as manager of the Burnham Corp., Elizabeth, Mr. Hoffman began as an apprentice molder in 1883. Barnet Bernbaum, 77, of East Cleveland, Ohio, who began as a core furnace molder's apprentice in 1884 and retired as a foundry consultant, and Albert H. Quitman, 75, of Stamford, Conn., who is general foreman of Yale & Towne Mfg. Co., and who began as a metal patternmaker's apprentice in 1887, completed the list of foundrymen with service records of more than 60 years. The other 43 old timers to receive 50-year pins represent every phase of the foundry industry. These men have lived and worked through the period of greatest development seen in the industry.

Cab Drivers Like A.F.A. Convention

Political conventions may have a wider influence on the lives of more people, but Philadelphia cab drivers will not soon forget the A.F.A. 52nd Annual Foundry Congress and Show held last May.

Deploring his low income from tips during the Republican national convention, a Philadelphia cab driver is reported by the Associated Press to have said: "It's nothing like that foundrymen's convention we had here. *That,* chum, was a *convention.*"

French Exchange Paper From A.F.S. Entitled "Risering of Castings"

EXCHANGE PAPER to the Association Technique de Fonderie from the American Foundrymen's Society will be written by J. B. Caine, metallurgist, Sawbrook Steel Castings Co., Lockland, Ohio. To be presented at the 22nd Annual Congress of France's Foundry Technical Association, Mr. Caine's paper is entitled "*The Risering of Castings*" and will cover the fundamental principles involved in the use of risers.

Marcel Ballay, president of Association Technique de Fonderie, has announced that the organization's 1948 Annual Congress will be held October 8 and 9 at the National School of Arts and Trades, Paris, and extends an invitation to A.F.S. members to attend.

Tennessee Chapter Installation Highlights First Annual Meeting

THE TENNESSEE CHAPTER WAS INSTALLED at its first annual business meeting at the Patten Hotel, Chattanooga, May 28. Ninety-two members and guests saw Technical Director S. C. Massari present the cast iron rattle to Chapter Chairman G. Frank Anderson, Chattanooga Implement & Mfg. Co., in the traditional ceremony marking installation of a new chapter.

Other highlights of the evening included Mr. Massari's coffee talk on responsibilities of a chapter announcement of officers and directors for the coming year, and a talk by L. D. Pridmore, International Molding Machine Co., Chicago.

As a result of the evening's activities 21 new applications for membership were received.

Officers for the coming year are the same men who acted for the steering committee at the organization meeting February 10. In addition to Mr. Anderson, they are: *Vice-Chairman,* Charles E. Saunders, Tennessee Products & Chemical Corp., and *Secretary-Treasurer,* A. D. Willis, U.S. Pipe & Foundry Co.

Speaking on "Molding Machine and Core Blowing Practice," Mr. Pridmore described the fundamentals of mechanized mold production and core blowing, illustrating his talk with instructive slides.

Chapter Chairman G. Frank Anderson, Chattanooga Implement & Mfg. Co. (left), and Director K. L. Landgrebe, Wheland Co., Chattanooga, discuss policies and problems of the newly-installed Tennessee Chapter.

French visitors to the 52nd Annual Foundry Congress pose with National President Max Kuniansky, National President-Elect William B. Wallis, and their compatriot, the chef of the Bellevue-Stratford hotel.

VISITORS FROM 17 COUNTRIES ATTEND 52ND FOUNDRY CONGRESS

FOUNDRYMEN FROM 15 OVERSEAS LANDS and from Canada and Mexico signed the International Guest Register at the 52nd Annual Foundry Congress of the American Foundrymen's Association in Philadelphia, May 3 through May 7.

The total of 223 international visitors included 168 from Canada and Newfoundland, four from Mexico and one from Cuba, comprising the North American contingent. Visitors from Europe included 15 from England, ten from France, four from Sweden, two from Switzerland, and one each from Norway, Belgium, and Italy. South America was represented by two visitors from Uruguay and two from Argentina.

Travelers from the most distant lands were two foundrymen from Australia, one from Pakistan, one from India and six from China.

Among the distinguished foreign visitors who addressed the Convention were Henton Morrogh of the British Cast Iron Research Association and E. Longden, who delivered the British Exchange Paper and brought greetings from the Institute of British Foundrymen to the Annual Meeting May 5.

The following is a roster, arranged by countries, of the foreign visitors at the Convention:

ARGENTINA

Buenos Aires

S. A. JUAN B. ISTILART, LTD. Domingo Cañueto; Armando R. Louge

AUSTRALIA

Melbourne

BROKEN HILL PTY. LTD., THE. Walter Noad, American Rep.

Sydney

WM. A. GIBSON. Wm. A. Gibson, Consulting Engr.

BELGIUM

Couillet

OILLARD STEELWORKS CHARLEROI. Paul Brine

CHINA

Kunming

CHINA ELECTRIC STEEL WORKS. Chin-Chien Chow, Asst. Chief Engr.

Nanking

NATIONAL RESOURCES COMMISSION OF CHINA. Shu Kwang-Chi; K. H. Huang

Shanghai

PEI-YEN CHAO. Pei-Yen Chao

KING WEI MACHINE CORP. Lo Sheng; F. S. Cheng

CUBA

Habana

LAMPARAS "QUESADA" S.A. Ildefonso Quesada, Pres.

ENGLAND

Birmingham

BRITISH CAST IRON RESEARCH ASSOCIATION. H. Morrogh, Research Manager; J. G. Pearce, Director

TYSELEY METAL WORKS LTD. W. G. Mochrie, Met.

Burnley

THOS. ASHWORTH & CO. LTD. Stephen Stanworth, Director

Ipswich

CRANE LIMITED. J. B. Webster, Asst. Works Mgr.

Members and guests from three nations discussed their common interest—foundry practice—with A.F.S. officials at the Foreign Visitors' Reception. Starting left: R. L. Handley, England; President Max Kuniansky; President-Elect William B. Wallis; A. O. Ulloa, Mexico; C. A. Phalnikar, India; Director-Elect Robert Gregg; H. Morrogh, England, a Convention speaker.

Lancashire
FERRANTI LTD., HOLLINWOOD. R. Laroux Handley, Mgr. Fdry. Dept.
Langley
LANGLEY ALLOYS LIMITED. Arthur A. Rowse, Chrmn. of Directors; G. Skript, Managing Director.
London
ALLIED IRON FOUNDRIES LTD. R. E. Boone
CORN PRODUCTS CO., LTD. C. L. Clarke.
FOUNDRY MECHANISATIONS (BAILLOTT) LTD. Arnold Walkers, Director
J. B. WEBB CO. S. R. Devlin, English Rep.
Manchester
P. R. JACKSON & CO., LTD. E. Longden, Works Mgr.
Royston
W. A. TURNER, JEFFREY & CO. William A. Turner, Partner
Sheffield
MILLSPAUGH LTD. E. Ayres, Foundry Supt.

FRANCE

Eure
FONDERIE DES ARDENNES. Pierre Raugenet, Directeur Technique; Georges Daugenet, Directeur
Fumel
SOCIETI DES FONDERIES DE PONT A FUMEL. Philippe Verge, Ingenieur
Lyon
DURRSCHMIDT CO. A. Rougier, President
Nancy
FDY DE PONT A MOUSSON. J. Cavallier, Pres.
SOCIETI DES FONDERIES DE PONT A MOUSSON. Hubert H. Cousin, Ingenieur; Georges Daillot, Ingenieur
Paris
STEIN & ROUBAIX. R. Boutigny, Chief Engineer
Seine
BONVILLAIN ET RONCERAY. Robert Bideau, Directeur; Robert Ronceray, President

This group from South of the Border at the Foreign Visitors' Reception with President-Elect Wallis (center) includes, left to right: William F. Bollinger, Juan Collingnon, N. S. Covacevich, Delbert G. Luper, Juan Collingnon, Jr., and A. O. Ulloa, all of Mexico.

INDIA

Kirloskar Wadi
KIRLOSKAR BROTHERS LTD. Chintamani Anant Phalnikar
Coimbatore
GOVERNMENT OF INDIA. G Ramakrishnan

ITALY

Turin
NEBIOLO. Babina Guglielmo, Export Mgr.

NORWAY

Hommelvik
HOMMELVIK VERFT & STOPERI. Erik Martin Johannsen, Works Mgr.

PAKISTAN

Moghalpura
GOVERNMENT OF PAKISTAN. M. S. Riaz

Visitors from the United Kingdom talk things over with A.F.S. national directors at the Foreign Visitors' Reception during the 52nd Foundry Congress. Starting left: National Director J. E. Kolb; E. Ayres, England; National Director F. M. Wittlinger; E. Longdon, representing the IBF; and R. L. Handley, England.

SCOTLAND

Glasgow
J. R. McKELLAR (ALLOYS) LTD. William Dickie, Director
RENFREW FOUNDRIES. J. Allan

SWITZERLAND

Fribourg
FONDERIE DE FRIBOURG S. A. Pierre Sieber, Gen. Mgr.
Winterthur
SULZER BROS. Walter Meier, Asst. Mgr.

SWEDEN

Gothenburg
CORONARESKEN. Eric Höglund, Mgr.; F. Warkmann, Mgr.
Katrineholm
S K F BALLBEARING CO. J. Erik Ongman, Fdy. Engr.
Malmo
A. B. LIMHAMNS ADUCERINGSVERK. Sten Linander, Asst. Mgr.

URUGUAY

Montevideo
PESCE & SIMEONE S. A. Isaias A. Pesce, Pres.; Isaias S. Pesce, Jr.

International guests at the Reception and National Secretary-Treasurer Wm. W. Maloney listen in as European-educated Dr. H. Ries, former head of Cornell University's geology department, tries out his knowledge of languages. Starting left: Dr. Ries, Walter Meier of Switzerland, Delbert H. Luper of Mexico, Secretary Maloney, and Erik Johannsen of Norway.

CONTROLLING FOUNDRY COSTS

Ralph L. Lee
Secretary-Treasurer
Grede Foundries, Inc.
Milwaukee

Installation and use of a proper foundry cost system is the subject of this, the twenty-seventh in the unbroken series—1922-1948—of Exchange Papers from the American Foundrymen's Association to the Institute of British Foundrymen. Presented at the 45th Annual Meeting of the Institute of British Foundrymen, in London, June 8 to 11, 1948.

Almost all of the foundry trade associations in the United Kingdom and the United States have published or have available good cost systems. For the average foundry, it is more a matter of deciding how simple or how complex the cost system should be and then putting it into operation.

The problem in many foundries is that a great deal of time and money is expended in obtaining the correct results of past operations and then these "costs" go into a binder or folder and are "kept" under cover. The writer has been in a number of foundries where the costs are carefully completed and balanced with the ledgers in from two to four months after the finished castings have been shipped and then the cost reports are filed. This method of "keeping costs" may give employment in and be a pleasure to the cost department, and the pay roll and other costs may be distributed to the penny, but it does not help in intelligent and profitable operation of the foundry.

No cost system is of real value unless it can be and is used to judge current operations and accurately forecast results. How can this be done? The system may be used for both current and future operations.

Current Operations

Costs should be completed quickly and compared with the estimating sheets to ascertain that the estimate is correct.

Prices on new orders should be checked and if the cost experience is fairly recent this cost may be used as a guide.

If the estimate is correct, then the labor and other costs become "standard" and only those costs which are under or over standard are reported.

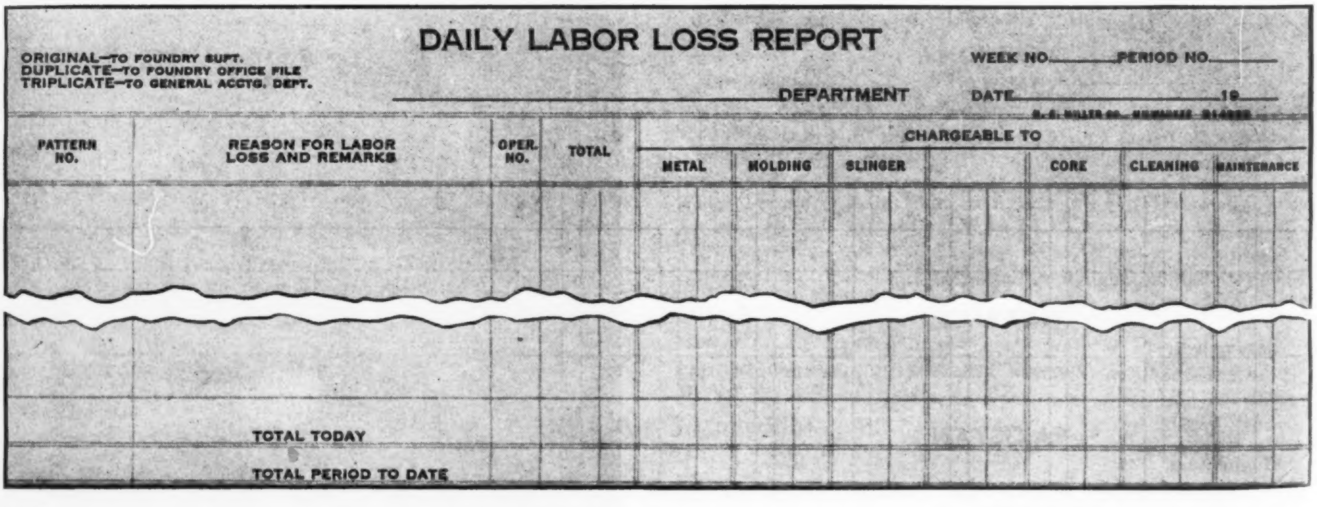
Almost all of the overhead items are costed as a percentage of direct labor in the departments. Usually in the preparation of this overhead percentage, *excess* direct costs are included in the direct labor money total on which the overhead percentage for indirect costs is established. And, unless the excess labor cost can be eliminated, then it must become a part of the standard cost used on the estimate sheet for the particular job or that part of the overhead will be lost.

For intelligent operating management, these excess costs must be brought to the attention of the supervisors promptly. What good does it do to tell a superintendent in March that a job cost too much in January? He should know within a day or two in order to make corrections while the job is running.

A daily report of excess charges may be made as shown in Fig. 1.

Department and plant supervisory meetings should be held to discuss these excess charges and proper action should be taken. As stated above, if the excess cannot be eliminated, then it must become a part of the standard and included in the cost on the estimate sheet. These daily reports should then be combined and reported on a weekly summary as shown in Fig. 2.

Fig. 1—Daily labor loss report records excess charges.



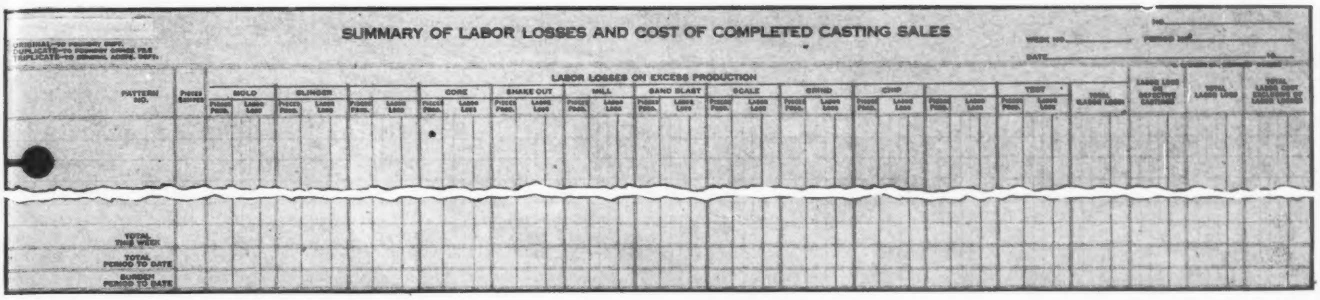
DAILY LABOR LOSS REPORT

ORIGINAL—TO FOUNDRY SUPT.
DUPLICATE—TO FOUNDRY OFFICE FILE
TRIPLICATE—TO GENERAL ACCTG. DEPT.

WEEK NO.______ PERIOD NO.______

______ DEPARTMENT DATE______ 19__

PATTERN NO.	REASON FOR LABOR LOSS AND REMARKS	OPER. NO.	TOTAL	CHARGEABLE TO						
				METAL	MOLDING	SLINGER		CORE	CLEANING	MAINTENANCE
	TOTAL TODAY									
	TOTAL PERIOD TO DATE									



Having the historical record of past costs on a particular casting and the percentage increases or decreases in labor, metals, etc., it is an easy matter to forecast results on the basis of past experience. These results are checked currently by the method shown under "Current Operations." The estimate sheet is revised by using the current change percentages and then the new estimate becomes the "standard cost."

Future Operations

Overall average percentages should not be used. The writer has seen cases where a foundry has used averages and compared, say, January 1947 with January 1948, where increases have been as follows:

	Average Per Cent of Total	Per Cent Increase Jan. 1948 over Jan. 1947	Present Cost	Average Increase Per Cent
Metals	14	50	21.00	
Direct Labor	21	12	23.52	
All other costs	65	17	76.05	
	100	—	120.57	20.57

(It must be emphasized that the percentages shown are for purposes of illustration and are not actual)

Using average figures, this percentage of 20.57 would be used on all castings.

It would be quite a task to get these percentages on the individual castings, but the work in the average foundry can be divided into a number of classifications, the number depending on the complexity of the work.

How do the figures on certain classes of castings compare with the average? A comparison of a flywheel and a cylinder block for a Diesel engine follows.

Flywheel

	Per Cent of Total Cost	Per Cent Increase	Present Cost
Metals	50	50	75.00
Direct Labor	12	12	13.44
All other costs	38	17	44.46
	100		132.90

Per cent increase January 1948 over January 1947 — 32.90

Cylinder Block

	Per Cent of Total Cost	Per Cent Increase	Present Cost
Metals	19	50	28.50
Direct Labor	19	12	21.28
All other costs	62	17	72.54
	100		122.32

Per cent increase January 1948 over January 1947 — 22.32

The percentage difference here is 12.33 per cent (32.90 per cent minus 20.57 per cent), which on $1,000,000 production would be $123,000 and would probably be more than the entire anticipated profit.

If the average figure is used, under competitive conditions, a foundry using these and quoting against those using cost figures intelligently, would tend to fill up with work similar to the flywheel and would lose about 12½ per cent on each job. This figure might well be 20 per cent and higher on some jobs.

Fig. 2—Weekly summary of labor losses and cost of completed casting sales compiled from daily reports.

There are many other ways in which a cost system can be used profitably. Competition will be getting keener, the days of a seller's market are on the way out. Reference has been made chiefly to excess costs, but it must not be forgotten that where costs are lower than average the customer should get the benefit. If the casting price is too low the foundry will eventually go out of business. If the price is too high the customer may go out of business.

In the following section of the paper the methods used in applying payroll, production order and standard cost procedures in a foundry are outlined.

Payroll Procedure—Cleaning Department

Former Procedure—Under the procedure formerly in effect in the castings cleaning department, each employee kept a record of his individual production on an operation ticket. He recorded thereon the pattern number, operation, and number of pieces with respect to each pattern worked on during the day. At the end of the day the data shown on the operation ticket was copied on a second operation ticket, so that two identical records of production for each employee would be available. One copy would be retained by the individual employee to furnish him with a record of the work performed during the day. It would also serve as a medium on which he could compute his earnings for the day. The other copy was turned over to the timekeeping department for payroll purposes.

In the timekeeping department the information shown on each operation ticket for each employee was completely transcribed daily onto a summary of operations. This set forth a record of the work performed by each employee and the related earnings classified as to direct and indirect payroll, based on piecework, and the hours of daywork. The daily piecework earnings and hours of daywork for each employee were posted daily on a card, from the summary above referred to. The earnings for the payroll week were totaled and recorded thereon after the summary card had been matched with the related attendance clock card. The payroll check was issued on the basis of the information appearing on the summary card.

The foregoing method of compiling the payroll data involved a certain amount of duplication of clerical effort. In addition, it did not provide the basis for the accumulation of cost data for each lot of castings.

The revised procedure provides that each employee

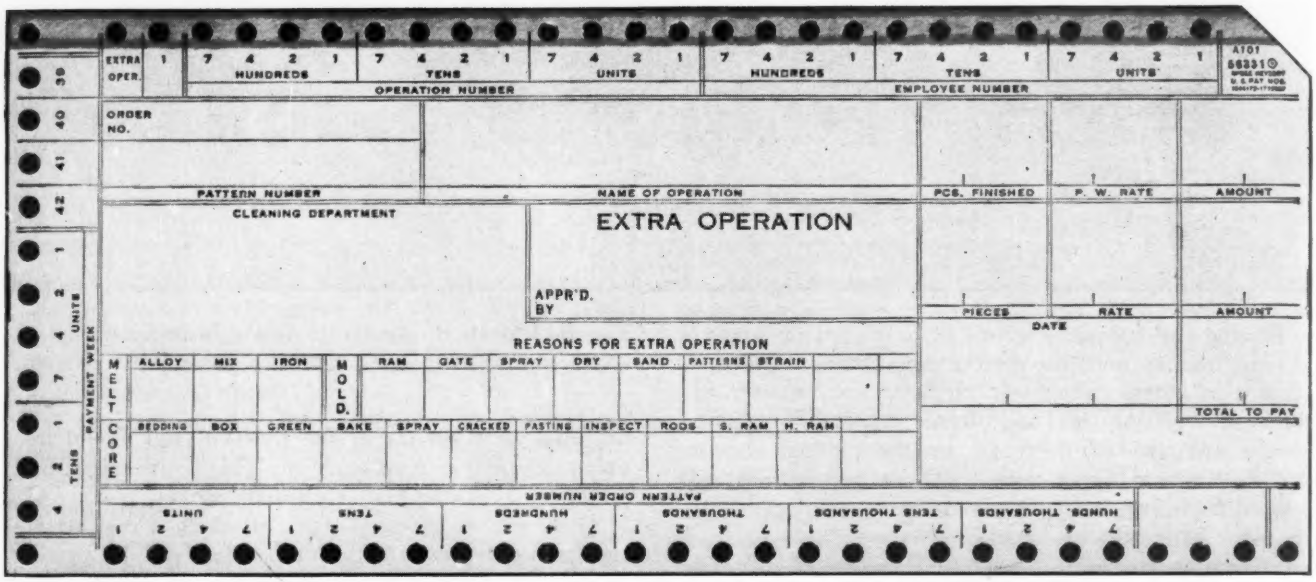


Fig. 3—A type of production ticket used to report cleaning department direct labor operations.

make out a separate production ticket covering the production with respect to each pattern worked on during the day. The production ticket is designed to facilitate preparation of the payroll and readily provide a means of tabulation of labor statistics with reference to each pattern produced. It includes a comparison of the quantity of each casting reported as produced at each operation with the quantity shipped.

One type of production ticket is provided, in addition to a daywork ticket, both of which are shown in Figs. 3 and 4.

Regular Form of Production Ticket—The ticket (Fig. 3) which will be used for the most part to report cleaning department direct labor operations is designed to provide space on the outer edges of the ticket to record the numercial code designation for the following: Employee number; labor operation number; pattern order number; payroll period—year and week; extra operation.

In the body of the card space is provided for the following data which will be recorded thereon by the employees indicated:

Cleaning department employee: Pattern number; name of operation; pieces finished; pieces finished on extra operation; date.

Cleaning department foreman: Pieces on which extra operation will be required; reason for extra operation; piecework for extra operation; approval.

Timekeeping department: Pattern order number; piecework rate and amount; amount of extra operation; total to pay.

The tickets will also bear the name and clock number of the employee, which will be imprinted on the cards with an addressograph.

It is the understanding that employees in the cleaning department work for the most part on one operation. Consequently it is intended that each employee be furnished with a number of tickets on which his employee number and operation number have been slotted in advance. To take care of the limited number of cases in the cleaning department where one employee performs several operations on the same casting, operation numbers will be assigned to cover each group of operations which might ordinarily be completed by one individual so that production can be reported by the employee under the appropriate operation number.

In the cleaning department it frequently happens that extra piecework allowances are made by the cleaning department foreman because of extra work on castings entailed by reason of faulty work in a preceding department. Space has been provided on the production ticket to record extra operations of this character, together with the related rate and payroll amount. The reasons for the extra work, together with space to indicate the number of castings under each reason, are also shown on the ticket, as follows:

Melting: Alloy; mix; and iron.

Mold: Ram; gate; spray; dry; sand; pattern; strain.

Core: Bedding; box; green; bake; spray; cracked; pasting; inspection; rods; soft ram; and hard ram.

The rates applicable to the extra operations will be noted on the tickets by the foreman, who will also indicate the cause of defectiveness necessitating the extra operation and approve the tickets.

In this connection, it is recommended that production tickets covering castings on which there will be an extra operation be written up in advance by the foreman to show the number of castings involved and the reasons for the extra operation. In the event the employee fails to complete the entire lot during the day, the foreman will change the quantity shown on the ticket by marking out the original quantity and inserting above the quantity actually finished. He will then prepare an additional ticket for the castings not completed and note thereon the cause of the defect.

Employees in the cleaning department will record their production by pattern numbers on the green production ticket in use in the department for that purpose, which they will retain as a record of their production for the day. In lieu of recopying the information onto a second production ticket, however, they will make out a production ticket for each pattern, showing operation, number of pieces, pattern number and date

for use of the office in computing the payroll and compiling statistics relating to the foundry production.

The classification of time and earnings will be made in the timekeeping department, but the clerk in the cleaning department will, at the end of the day, record the total number of tickets for each employee including daywork tickets, if any, on the reverse side of one of the production tickets. This will furnish the timekeeping department with a means of determining that all of the tickets for each employee for the day are accounted for. In addition the clerk will record on the same ticket the total hours worked by the employee for the day. The information for this record will be obtained from the attendance clock card.

Regular piecework tickets which are not pre-slotted with the operation number will be made available to each employee. These tickets will be used in instances where the employee is engaged on a piecework operation to which he is ordinarily not assigned, in which case it will not be possible to pre-slot the card for the operation number; the operation number will be slotted after the card has been turned in to the timekeeping department.

In addition to the regular production ticket described above, a special production ticket will be used in the cleaning department as follows:

Special Production Ticket for Reporting Re-operations—The special production ticket is also identical in form with the regular production ticket, except that no provision is made thereon to record extra operations as no extra operations should be involved in connection with the work to be reported on this ticket. The special operation ticket is to be used to record re-operations, necessitated by reason of faulty workmanship. Re-operations will usually be required by reason of welds or re-welds. The ticket will be pre-slotted for employee and operation number.

When a casting has been rejected by an inspector and one or more operations must be repeated thereon, because of welds or re-welds, or for other reasons, the work must be reported on the special ticket provided for the purpose. It will not be necessary to tag the casting or otherwise mark it to indicate to the employee that a re-operation is involved, as the position of the casting in the production line will constitute notice to that effect.

All special tickets reporting re-operations should be reviewed by the foreman before being forwarded to the timekeeping department. The tickets should be noted by him as to the department responsible for the special work, and the reasons therefor, so that proper accounting distribution may be made of the related payroll charges, in the timekeeping department.

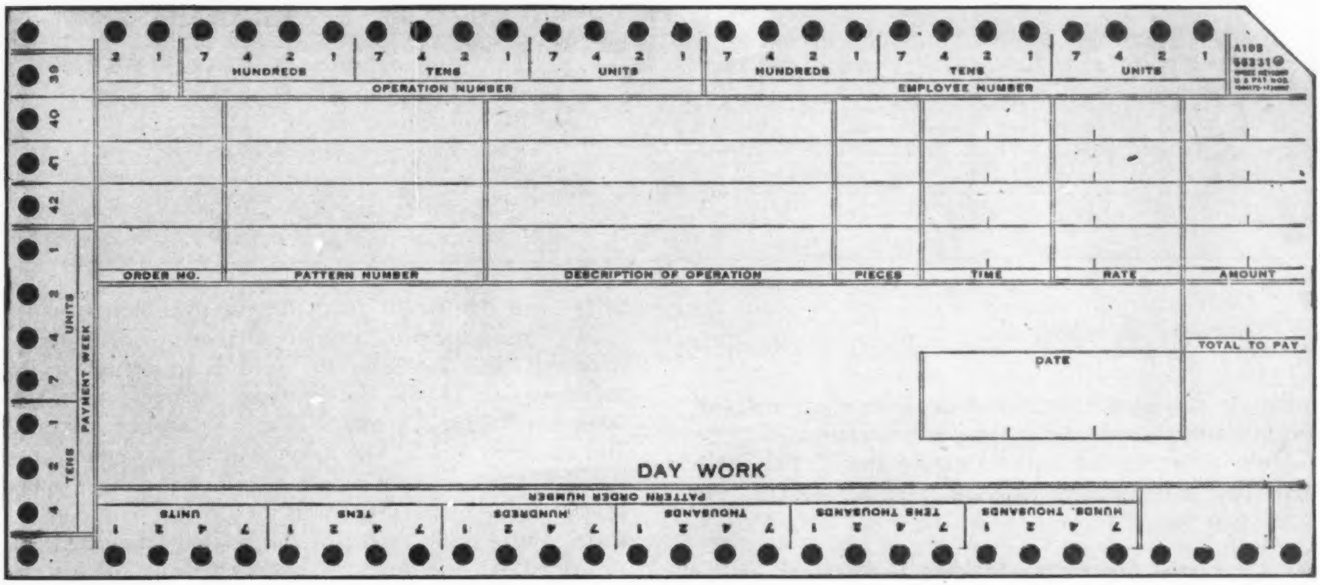


Fig. 4—Daywork ticket to report all indirect labor.

Tickets containing a record of extra operations and re-operations should be summarized daily in the timekeeping department. A daily report of the related excessive labor costs should be furnished to the foundry. This report will contain a record of the excessive labor costs at each operation with respect to each pattern number as well as the total amount for the day. In addition, these excessive labor costs will be set out separately in the general accounts, classified as to the departments responsible.

Labor loss on each pattern by operations, representing the difference between the quantity of castings reported as produced at each operation and the quantity shipped (after allowance for normal scrap) shall be determined when the job is finished and summarized on a weekly report (Fig. 2). In this manner any failure on the part of the foundry to report defective work as such will be subsequently disclosed.

Reporting Indirect Labor

Daywork Ticket—The daywork ticket (Fig. 4) is to be used to report all indirect labor, whether paid for on a daywork or a piecework basis. These tickets will be pre-slotted for the employee number only.

Each employee in the cleaning department will be furnished with a supply of the three types of tickets previously described. Each type of ticket will carry a different colored border to readily distinguish it from the others. They will all be addressographed in advance

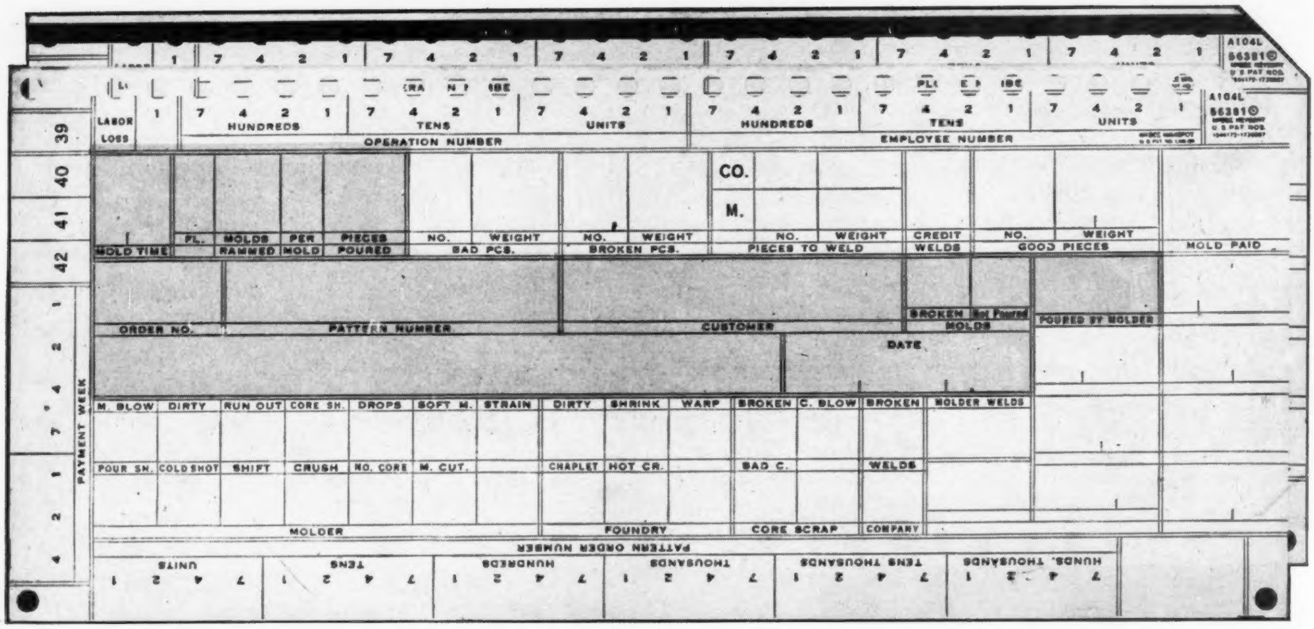

LABOR LOSS
39 40 41 42
HUNDREDS TENS UNITS
OPERATION NUMBER
HUNDREDS TENS UNITS
EMPLOYEE NUMBER
CO.
M.
MOLD TIME
FL.
MOLDS RAMMED
PER MOLD
PIECES POURED
NO. WEIGHT BAD PCS.
NO. WEIGHT BROKEN PCS.
NO. WEIGHT PIECES TO WELD
CREDIT WELDS
NO. WEIGHT GOOD PIECES
MOLD PAID
ORDER NO.
PATTERN NUMBER
CUSTOMER
BROKEN Not Poured MOLDS
POURED BY MOLDER
DATE
PAYMENT WEEK
M. BLOW | DIRTY | RUN OUT | CORE SH. | DROPS | SOFT M. | STRAIN | DIRTY | SHRINK | WARP | BROKEN | C. BLOW | BROKEN | MOLDER WELDS
POUR SH. | COLD SHOT | SHIFT | CRUSH | NO. CORE | M. CUT. | CHAPLET | HOT CR. | BAD C. | WELDS
MOLDER | FOUNDRY | CORE SCRAP | COMPANY
PATTERN ORDER NUMBER
UNITS | TENS | HUNDREDS | THOUSANDS | TENS THOUSANDS | HUNDS. THOUSANDS

Fig. 5—Two-part production ticket used in mold department to report direct labor operations.

with the employee's name and clock number, and will be pre-slotted with the employee's clock number. In addition, the regular ticket and the special ticket for reporting re-operations will be pre-slotted with the operation number.

Payroll Procedure—Molding Department

The revised payroll procedure requires that the mold checker prepare a separate production ticket covering the production of each employee on each separate pattern worked on during the day. The production ticket is designed to facilitate preparation of the payroll and tabulation of labor statistics with reference to castings produced compared with the quantity shipped.

Two separate forms of tickets will be used to report labor operations in the mold department—first, a production ticket for reporting all direct labor operations, and second, a daywork ticket for reporting all indirect labor operations, whether paid for on a daywork or piecework basis.

Production Ticket—A sample of the production ticket to be used in the mold department for reporting direct labor operations is shown in Fig. 5.

The production ticket consists of two parts: (a) original, on paper stock, which will be used as a scrap report in the manner hereinafter described and (b) duplicate, which will constitute the record of production on which employee earnings will be computed.

Space is provided on the outer edge of the ticket to record the numerical code designation for the following: Employee number; labor operation number; pattern order number; payroll period—year and week; labor loss.

The employee number and labor operation number will be slotted on the tickets, and the name and clock number of the employee addressographed thereon, in the space provided, before the tickets are distributed for use. The pattern order number, payroll period, and labor loss will be slotted on the tickets after they have been turned in to the plant timekeeping department.

The reason for providing for a labor loss code designation on the border of the card is to permit ready accumulation in the timekeeping department of the labor cost of broken molds, company broken castings, and company welds. The recommended procedure provides that tickets containing a record of the above operations be summarized daily in the timekeeping department, and a daily report of the related labor costs be furnished by the foundry, segregated as to pattern number. In addition, the amount of these labor losses will be set out separately in the general accounts. Excessive labor costs must be properly segregated and classified in order to be adequately controlled.

The various molders will not record their own production; this will be done by the mold checker in conformity with the practice heretofore followed. The mold checker will prepare a separate ticket covering the production on each pattern by each employee during the day. In the body of the card space is provided for the following data which will be recorded thereon by the employees indicated:

Mold checker on original and duplicate tickets: Pattern number; mold time; floor; molds rammed; pieces per mold; molds broken; molds not poured; molds poured by molder; date.

Timekeeping department on duplicate ticket: Pattern order number; pieces poured; bad pieces; broken pieces; pieces to weld; credit welds; good pieces; molds paid; weight each; shakeout labor rate and amount; mold and pour rates; mold and pour amounts; pattern change amount; total to pay; reasons for defects.

Inspector on original ticket: Reasons for defects.

The mold checker formerly recorded the above information on a piece of scratch paper from which it was later transferred to a form designated as a mold checker's record. The information shown on the mold checker's record as to the production of the various molders for the day was subsequently transferred to a daily summary on which the earnings of the various employees in the molding department were later computed. The computation of earnings for each employee

was made when the scrap report relating to the day's production was turned in by the inspector, which permitted the determination of the number of pieces on which the employee was entitled to receive payments.

The information to be noted on the production ticket by the mold checker, as outlined above, will be written on the original copy of the ticket, but it will also appear on the duplicate by reason of carbon spots affixed to the reverse side of the original.

Pattern Changes Recorded

The number of pattern changes made by each molder during the day will be accumulated and recorded by the mold checker on the ticket covering the last production for each molder for the day.

Slinger molding is a crew operation. The mold checker will prepare a production ticket covering the production on each pattern by the slinger molder crew. In addition one ticket for the day will be prepared for each man participating in the slinger mold production, on which will be indicated that the employee is a member of the crew, and the total number of hours he has worked in that capacity. The distribution of the crew earnings will be made in the timekeeping department.

With respect to shakeout, which is also a crew operation, a daily ticket will be prepared for each member of the shakeout crew, showing total hours worked in that capacity. The labor cost of the shakeouts relating to each pattern will be computed on each production ticket in the timekeeping department, based on the shakeout rate applicable to each pattern, and the total shakeout labor for the day determined, which will be divided between the individual crew members according to hours worked.

After the production tickets have been completed by the mold checker in the manner indicated above, he will detach the original from each ticket and pass it along to the inspector, which the latter will use to record the scrap relating to the particular production. The duplicate of the production tickets will be given to the timekeeping department.

Scrap Classified

The inspector will record on each ticket the quantity of scrap relating to the particular production, classified according to the reasons, and indicating the responsibility, as set out on the ticket. Such classification of scrap involves no changes in the procedure formerly followed. He will then forward these scrap reports to the timekeeping department, where they will be matched with the related duplicate tickets, and the information transferred to the latter record. The duplicate ticket will then contain a complete record of the production for which the employee will receive payment, as well as a record of the scrap produced.

When the information shown on the scrap reports has been transferred to the duplicate tickets covering the production for the day, the scrap reports will be returned to the foundry where they will be turned over to the respective employees to furnish them with a record of their production.

The mold checker will, at the end of the day, record the total number of tickets for each employee, including daywork tickets, if any, on the reverse side of one of the production tickets. This will furnish the timekeeping department with a means of determining that all of the tickets for each employee for the day are accounted for. In addition, he will record on the same ticket the total hours worked by the employee, which information will be obtained from the attendance card.

Daywork ticket—The daywork ticket is to be used to report all indirect labor, whether paid for on a daywork basis or a piecework basis.

Individual daywork tickets should be prepared for each member of the mold pouring crew.

The daywork tickets will be pre-slotted for the employee number only.

The mold checker will be furnished with a supply of the production and daywork tickets for each employee. The two types of tickets will carry different colored borders to distinguish them from one another. They will be addressographed in advance with the employee's name and clock number, and will be pre-slotted with the employee's clock number. In addition, the production ticket will be pre-slotted with operation number.

Payroll Procedure—Core Department

Under the procedure formerly in effect in the cleaning department, each core checker kept a record of daily production of cores for employees by pattern number. These reports were turned in to the timekeeping department each day, where they were posted to a daily summary of cores produced by pattern number for each core maker. At the end of the weekly pay period, the total production for each pattern was ascertained and extended at the established piecework rates, and the total piecework earnings for the employee were determined and recorded on his weekly summary of production.

The revised procedure provides that the core checker make out a separate production ticket covering the production of each employee with respect to each pattern worked on during the day. The production ticket is designed to facilitate the preparation of the payroll and the tabulation of labor statistics with reference to each casting produced, compared with the quantity shipped.

Two separate forms of tickets will be used to report labor operations in the core department—first, a production ticket for reporting all direct labor operations, and, second, a daywork ticket for reporting all indirect labor operations, whether paid for on a daywork or piecework basis.

Production ticket—A sample of the production ticket to be used in the core department for reporting direct labor operations is shown in Fig. 6.

It will be noted the ticket is designed to provide space on the outer edges thereof for the numerical code designation for the following: Employee number; labor operation number; pattern order number; payroll period—year and week.

The employee number and labor operation number will be slotted on the tickets, and the name and clock number of the employee addressographed thereon, in the space provided, before the tickets are distributed for use. The pattern order number and payroll period will be slotted on the tickets after they have been turned in to the timekeeping department.

Each core maker will prepare a separate ticket covering his production with respect to each pattern num-

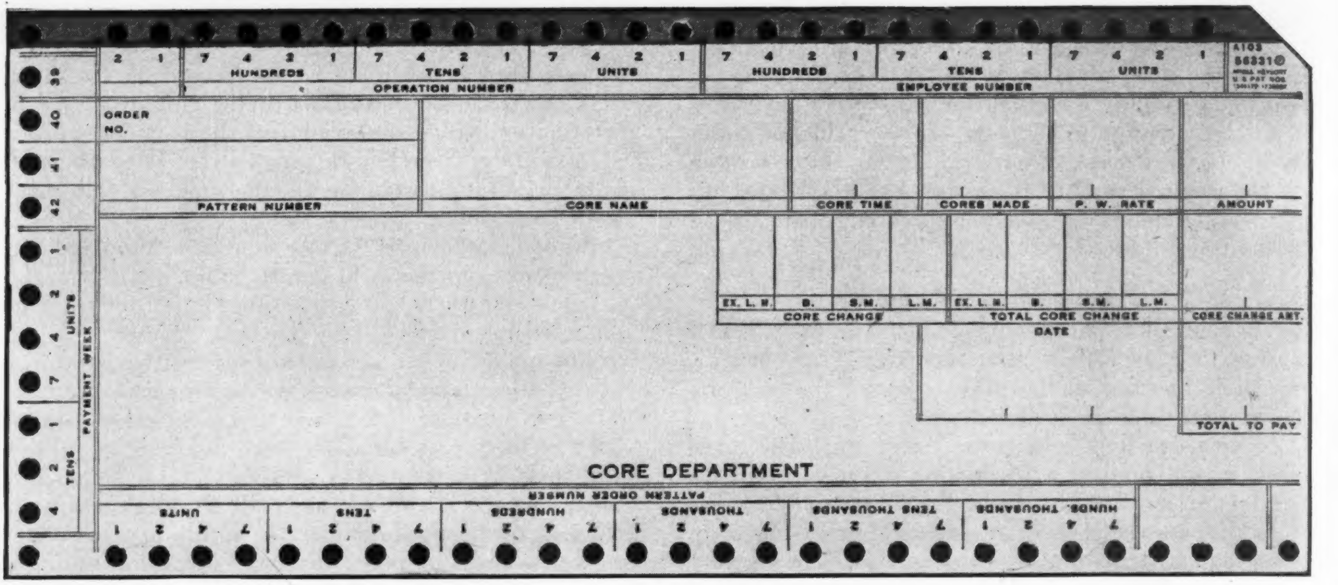


Fig. 6—Production ticket used in core department for reporting departmental direct labor operations.

ber, recording on the ticket the following information: Pattern number; core name; core time; cores made; and date.

In addition he will record the core change, if any, classified as to type, in the space provided on the ticket. The number of core changes made by a core maker during the day will be accumulated in the timekeeping department, from the information shown on the individual tickets, and be recorded on one ticket for the purpose of computing the earnings applicable thereto.

The clerk in the core department will, at the end of the day, record the total number of tickets for each employee, including day-work tickets, if any, on one of the production tickets. This will furnish the timekeeping department with a means of determining that all of the tickets for each employee for the day are accounted for. In addition he will record on the same ticket, in the space provided on the reverse side of the ticket, the total hours worked by the employee, which information will be obtained from the attendance clock card.

Daywork ticket—The daywork ticket is to be used to report all indirect labor, whether paid on a daywork or a piecework basis. These tickets will be pre-slotted for the employee number only.

Each employee in the core department will be furnished with a supply of the production and daywork tickets. Each type of ticket will carry a different colored border to readily distinguish it from the other. They will both be addressographed in advance with the employee's name and clock number, and will be pre-slotted with the employee's clock number. In addition, the production ticket will be pre-slotted with the operation number of the work to be performed.

Payroll Procedure—Cupola Department

A special payroll ticket (Fig. 7) has been designed for reporting cupola production.

The ticket will be pre-slotted with the operation number and employee clock number, and will be addressographed in advance with the employee's name and clock number. This refers to the name of the employee responsible for the cupola work. As will be noted, provision is made on the bottom of the ticket for the name of the helper, whose name will be inserted on the ticket by the crew leader.

The tons of metal melted and time elapsed will be recorded on the ticket by the crew leader, as well as the time worked by the helper.

In addition, it will be necessary for the helper to make out a ticket on which will be shown the hours worked, which ticket will be used in the timekeeping department to record his daily earnings, as computed on the cupola ticket.

Timekeeping Department Procedure

When the daily production and daywork tickets are turned in to the timekeeping department by the various foundry departments, they will be handled in the following manner:

A. The tickets will be reviewed to see that all of them are on hand according to the number of tickets reported by the foundry timekeeper as covering each employee's work for the day, and also to see that the date is shown on all tickets.

B. The tickets will be gang-punched to record the pay period.

C. Production tickets on which the operation number has not been pre-slotted will be sorted out and slotted for the operation number. Such tickets will consist principally of cleaning department tickets reporting operations on which the employee is not ordinarily engaged, and consequently for which the tickets had not been pre-slotted for operation number.

D. Tickets will be manually sorted as to pattern number, and then taken to the pattern price record, from which the standard pattern order number, and piece-work rates will be posted to the tickets. Having all tickets relating to a particular pattern number grouped together will facilitate the pricing thereof from the pattern record, and effect a saving of time as compared to the method previously employed.

E. Wherever necessary the tickets will then be regrouped according to standard pattern order number, which will in all cases identify the pattern number, and

the tickets gang-punched for pattern order number. In this connection, it is intended that a pattern order number will be assigned to each new pattern as it is received and will apply to that particular pattern on all subsequent orders.

F. After pricing and slotting of the standard pattern order number the tickets will be extended for gross earnings.

As it will be necessary to separate the tickets covering labor performed in the molding department, both direct and indirect, from those relating to other departments, due to the fact that it will not be possible to compute the earnings on the molding department production tickets until the scrap reports relating to the particular day's production have been turned in, it will be found advantageous to set them aside as the gross earnings are being extended.

G. As the gross earnings are being extended, cleaning department tickets on which extra operations are recorded, will be set aside and gang-punched to identify them as tickets which will show labor losses.

The labor cost of extra operations and re-operations in the cleaning department, and the labor cost of broken molds, company broken castings, and one-half the labor cost of company welds in the mold department are considered labor losses due to defective work. These labor losses will be determined and set out daily on a special report for each department. However, with respect to molding department tickets, information as to company broken castings and company welds will be slotted to identify them as labor loss tickets, and the daily labor loss report prepared.

Procedures in Timekeeping Department with Respect To Labor Tickets Other Than Molding Department

1. The amount of earnings should be computed and recorded on each ticket.

2. The tickets should be added to establish a control total on the payroll for the day, and recorded on a "summary of payroll and labor distribution." Only the total will be recorded at this time which will serve as a control for the subsequent distribution of labor according to the various classes thereof. As hereinafter provided the daily total as herein recorded and distributed will be equal, in exact amount, to the amount of earnings recorded daily on the employees earnings cards, from which the payroll will be prepared.

The summary of payroll and labor distribution has been so designed that it will serve as a control on the total accumulated payroll each day, distributed according to labor classification in each department. It will provide a ready summary of labor costs, and distribution thereof, for each week. This will act as a control amount on the payroll which will be paid for that week, and also will provide a basis for distribution of labor at the end of each accounting period. In addition to this, the summary will also furnish the basis from which will be obtained a periodic control total for the accumulation of labor costs according to pattern number, as well as a daily control total of the labor losses as analyzed and reported by the daily departmental labor loss reports.

3. From the cleaning department tickets on which extra operations are shown, and which have been set apart at the time they were priced and extended, there will be prepared a statement, in triplicate, showing the total of such extra labor costs by pattern number, operation, and the department responsible.

The original of this daily departmental labor loss report will be furnished to the foundry department; the duplicate thereof should be retained in the foundry office files, and the triplicate forwarded to the general accounting department. As the information contained in this report is of vital importance to the foundry superintendent every effort should be put forth to supply this information as soon as possible. It should be an established rule that this report be completed immediately after tickets have been priced, extended, and the extra operation cards sorted out and controlled.

This daily departmental labor loss report will show the amount of the loss for which each department

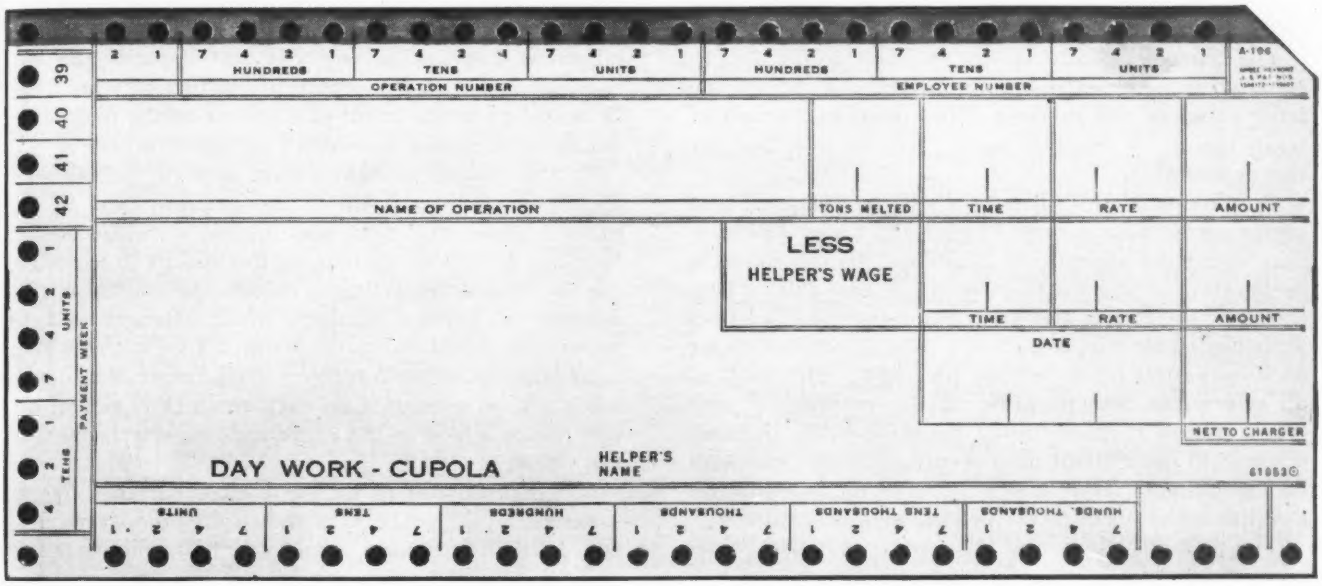


Fig. 7—Payroll ticket for reporting cupola production.

has been responsible and the pattern numbers on which the loss was incurred. A daily total of the total loss chargeable to each department will be obtained and recorded. This daily total should be added to the accumulated total for the period to date as shown on the previous day's report so that a current total for the period to date is shown in each daily report. At the end of the period, the accumulated total of labor loss chargeable to each department, as shown by the report for the last day of the period, will serve as the basis for posting the schedule entry which will credit the total labor loss amount and charge an appropriate departmental labor loss variance account for that portion of the labor loss for which the department was responsible.

The foregoing daily report of labor losses due to extra operations and re-operations will not include the labor losses of the molding department as a result of scrap molds. A separate report will be prepared for this department.

4. A daily labor distribution will be prepared and posted to the Summary of Payroll and Labor Distribution, under the appropriate headings. To facilitate the preparation of this distribution the tickets will be keysorted by operations and arranged in operation number sequence. This will permit of a total of the tickets for each operation being readily prepared. The total of all operations, except those of the molding department, posted as above noted, must be equal in exact amount to the control total recorded on the summary of payroll and labor distribution chart immediately upon completion of ticket pricing and extension.

The daily distribution of labor will not include overtime or special allowances as the amounts thereof will not be determinable until the end of the weekly pay period. These allowances will be made, using as a basis the average hourly rate developed for the current weekly payroll, and will be included with the tickets for the last day of the current week.

Before describing further procedures which are to be followed and operations that are to be performed on the labor tickets described in this section, the special procedures relating to labor tickets of the molding department will be outlined to that point at which procedures are identical for all departments.

Procedures in Timekeeping Department Relating To Molding Department Labor Tickets

In preceding paragraphs were described the operations that are to be performed on the molding department tickets up to the point of insertion of the piecework rates on the tickets. At that point the molding department tickets were set aside due to the fact that earnings thereon could not be calculated as good production was not recorded and cannot be recorded until after scrap reports for the day are received from the foundy.

The molding department tickets, that have been segregated as above noted, will be subject to the following procedures:

1. Keysort the tickets so as to place them in numerical order as to employee number. Keep all of the tickets for the day intact pending the completion by the inspector of the related scrap reports.

2. When the scrap reports covering the day's production are turned in to the timekeeping department they will be matched with the related production tickets, and the information shown on the scrap reports transferred to the tickets. When this is accomplished the tickets will contain a complete record of gross production, and net production on which earnings are to be computed, as well as a record of scrap produced.

3. After the information shown on the scrap reports has been transferred to the tickets covering the production for the day, the scrap reports will be returned to the foundry where they will be turned over to the respective employees to furnish them with a record of their net production.

It is important that all information appearing on the scrap report be copied on to the production ticket, as otherwise the timekeeping and cost departments will not possess a complete record of production which will be necessary in the event of question on the part of an employee as to the amount of his earnings.

4. The payroll amount should now be extended on each ticket. In addition to the determination of the mold amount, this may also involve a calculation of earnings for molds poured, if the molder has poured his own molds, as well as a calculation of earnings on account of pattern changes, which changes will be accumulated and shown on one ticket for each molder.

In addition to the foregoing, the amount of shakeout labor will be computed on each production ticket, but will not be added to the employee's earnings shown on the ticket.

5. Total amount of shakeout labor earnings due to shakeout crew members, as shown on production tickets, and distribute total earnings to individual shakeout crew tickets.

6. Distribute slinger molding crew earnings as shown on master tickets to individual slinger crew tickets.

Shakeout and slinger molding are crew operations and the total of all earnings for the day as shown on the production tickets will be divided between the individual crew members on the basis of hours worked. An individual ticket will be filed by each employee who performs any shakeout labor or is engaged in slinger molding operations. The time spent by each employee on these operations will have been entered thereon by the foundry timekeeper.

Having obtained the total of earnings due to shakeout crew members the hours shown on the individual shakeout labor crew tickets will be totaled and the total earnings divided by the total hours to arrive at an average hourly rate. This developed rate will be applied to the hours worked by each crew member and the earnings as computed entered on the ticket. For example, if the total shakeout earnings for the day amounted to $15.00 and was earned by the shakeout crew consisting of five members who worked a total

Employee	Hours Employed	Earnings at Average Developed Rate
A	7	$ 5.25
B	5	3.75
C	4	3.00
D	2	1.50
E	2	1.50
Total	20	$15.00

of 20 hours, the computation would be made as follows:

Total earnings, \$15.00 $\div$ total hours, 20 = average hourly rate, \$0.75.

The total earnings of the slinger molding crew will be obtained from the master tickets covering the production on each pattern by the crew. These earnings will then be distributed among the various crew members on the basis of the hours worked by each, as shown on the daily ticket turned in by individual crew member. The manner of computation and distribution of the earnings of each crew member will be identical with that above described for earnings of the shakeout crew members.

7. The tickets will next be added to establish a control on the mold department payroll for the day, and the control total recorded on the summary of payroll and labor distribution chart.

The payroll and labor distribution here referred to is described in a foregoing section devoted to procedures relating to labor tickets for departments other than the molding department. The manner of recording the control total and distribution will be the same as provided for in that section. The total of the molding department tickets as daily recorded on this summary will be equal in exact amount to the amount of earnings posted to the employees' earning cards, from which the payroll will be prepared at the end of each week.

8. Keysort the tickets showing labor losses, which will comprise all tickets which include earnings for broken molds, company's broken molds, and company welds, and prepare a statement showing the total of such labor losses by pattern number under each reason.

In this connection, the labor loss to be shown for company welds is one-half the labor cost thereof and not the entire amount, which will serve to put company welds on the same basis as molder welds for labor statistical purposes.

The foregoing daily report of labor losses in the molding department will be in addition to the daily report of labor losses in the cleaning department, previously described.

9. Prepare a daily labor distribution. This will be posted to the summary of payroll and labor distribution, under the appropriate headings, in the same manner as provided for tickets of departments other than the molding department, fully described previously.

As in the case of the labor distribution relating to the other departments, the molding department labor distribution will also only include overtime and special allowance on a weekly basis, as previously stated.

Labor losses in the molding department will be charged to a special account, to be cleared at the end of the month by posting to appropriate departmental labor loss variance accounts, based on the information shown on the daily reports of labor losses.

Additional Procedures on Labor Tickets of All Departments

The following described procedures apply to the labor tickets of all departments, including molding.

After the daily labor distribution has been prepared, the labor tickets will be keysorted by employee number in order to group together all of the tickets for each employee for the day. The time and earnings segregated as to piecework, daywork, and overtime for each employee for the day will then be posted to a daily payroll summary ticket which will be maintained for each employee during each pay period. The foundry timekeeper will have previously recorded the total number of hours worked and the total number of tickets for each day. Therefore the total hours as now posted will balance with the original hours as entered by the foundry timekeeper, and the earnings of all employees will balance with the total earnings as controlled through the entries made in the summary of payroll and labor distribution.

In the cleaning department, where employees are not required to report the time spent on productive operations, the hours spent on piecework will be determined by deducting daywork hours, if any, from the total hours.

After the time and earnings of all employees have been summarized in the above manner, the total earnings shown on each employee's summary will be footed, and agreed with the payroll control for the day previously established.

At the end of the payroll period the daily payroll summary ticket will be footed and balanced to arrive at the total of the employees earnings for the period. A grand total of all employees earnings will be obtained and agreed with the grand total of earnings for the payroll period as shown by the summary of payroll and labor distribution. The tickets will then be forwarded, together with the adding machine tape showing the grand total of the tickets, to the general accounting department for preparation of payroll checks.

After payroll checks have been written and the daily payroll summary tickets returned, they will be matched with the related attendance cards of the employes. The two cards should be clipped together and permanently filed, arranged according to employee number sequence in each payroll period. After the individual employee's labor tickets have been kept intact for a sufficient length of time, they should be keysorted by pattern order number and grouped with like tickets relating to the same pattern order number already developed in prior payroll periods.

Subsequently, where the particular order is completed and shipped, the production tickets relating thereto will be used to accumulate certain labor cost data, as previously described under "summary of labor loss on completed castings."

Procedure for Computing Labor Loss on Completed Castings

As already explained the labor tickets will be filed by pattern order number after the payroll for the week has been prepared. This file of production labor tickets will be maintained in the general accounting department, and refers to production tickets covering the direct labor operations shown in Table I.

Operations shown in Table I do not cover all direct labor operations involved in the making of castings, but cover by far the major part of the direct labor expended which can be readily controlled for cost purposes. The direct labor operations which will not be controlled for cost purposes include cupola labor, pouring and shakeout labor of the molding and slinger departments, and inspection and shipping labor of the cleaning depart-

Table I—Direct Labor Operations

Name of Operation	Operation Number
Molding Department—Molding	5
Slinger Department—Molding	11
Core Department—Makers	15
Core Department—Pasters	16
Cleaning Department—Mill and tumble	21
Cleaning Department—Sand blast	22
Cleaning Department—Scale	23
Cleaning Department—Grind	24
Cleaning Department—Chip	25
Cleaning Department—Test	27

ment. It will be noted that the direct labor operations not to be controlled for cost purposes are negligible in amount and will in no way interfere with the efficient control of foundry operations by pattern numbers.

The purpose of instituting a cost control procedure is to determine and report to the foundry and general managements the amount of direct labor on major operations incurred in the production of castings in excess of the standard direct labor of those operations included in the cost estimate of the castings. The amount of the excess direct labor expended on the production of castings will be determined exclusive of the molding and cleaning departments' direct labor losses on broken molds and defective castings. As previously commented upon under the caption of "timekeeping department procedures" this latter group of labor losses will be reported daily by the timekeeping department for management control.

The production tickets, covering operations to be controlled for cost purposes, will remain in the timekeeping department files, by employee number, until sufficient time has elapsed to allow foundry employees to complete the computation of earnings for the week covered by those production tickets. When sufficient time has elapsed, the production tickets will be removed from the foundry timekeeping files and forwarded to the general accounting department for the purpose of computing costs.

Establish Control Record

The general accounting department will establish a memorandum control record of production tickets for the operations named at the fore part of this section. The amount to be charged to the control record will be the total of the labor distribution for the week covered by the production tickets for operations 5, 11, 15, 16, 21, 22, 23, 24, 25, and 27. Charges to this memo control record will be made weekly—one charge for each weekly payroll distribution.

The production tickets charged to the control record will be filed according to the standard pattern order number. Production tickets for succeeding weeks will be sorted into the file by standard pattern order number but it will not be necessary to sort the tickets in the file by labor operation numbers.

When the work on a particular pattern has been completed in the foundry and the casting shipped to the customer, the production tickets relating thereto will be used to develop the labor loss statistics by operations for the pattern in the manner and for the purpose set forth in the subsequent comments. To repeat, the tickets are already in pattern order number, the only additional operation required being to keysort the tickets relating to the pattern in order to group them by labor operations, according to the various labor operation numbers slotted on the border of the tickets.

When a foundry order has been completed the producing foundry will send a copy of its completed foundry order, on which has been recorded the total number of castings shipped and billed, to the general accounting department. The receipt of the completed foundry order by the general accounting department will be the basis for the removal of all labor production tickets for that particular pattern from the cost file.

The production tickets for each standard pattern order number should be sorted according to labor operation numbers and, in the case of molding operation No. 5 and slinger operation No. 11, the total number of molds paid for shall be determined from the tickets and subtraction from that amount should be made representing the number of defective molds represented by the labor losses noted on the production ticket by the timekeeping department. The net production of the molding and slinger departments and the gross production of the core and cleaning departments shall be recorded on a three-part form designed to accumulate the labor losses of completed patterns by major direct labor operations. The information necessary to record the costing of a completed casting will require a single line entry on this form.

Determine Operating Losses

The labor loss by operations will be arrived at by ascertaining the differences between the quantities reported as produced at each operation and the quantities shipped (after giving effect to the scrap allowance provided in the estimate) and extending such differences at the established piecework rates for the various foundry operations involved.

The total labor paid for the operations controlled under this procedure will be determined by computing the quantities reported as produced at each operation and recorded on the form, at the established piecework rates for the related operations. The total of the direct labor for the labor operations being controlled should be recorded on the form. That amount will be the basis for crediting the memorandum control record for production tickets removed from the file and costed. In addition to entering on this record the labor losses as determined through the above mentioned procedures, the total of the labor losses due to defective castings previously reported to the management for daily control purposes should be accumulated and summarized on this report in the following manner. The labor cost of defective work will be shown daily on a special report segregated as to pattern numbers, operations, and cause of defectiveness. However, that daily report will not reflect the accumulated labor loss of defective work for each pattern.

The production tickets for the labor losses in the molding, slinger, and cleaning departments incurred by reason of defective castings, extra operations, and reoperations on castings have been slotted in the timekeeping department in the space provided therefor. Accordingly, these production tickets can be readily removed from the rest of the production tickets by the

patterns. The total of the defective labor losses recorded on those tickets should be recorded on the labor summary in the space which has been provided.

Summary

To summarize, the labor summary of completed casting orders will include the following information which will be recorded on the form in a one line entry for each pattern:

Mold - -	Pieces produced
	Labor losses
Core - -	Pieces produced
	Labor losses
Mill - -	Pieces produced
	Labor losses
Sand blast -	Pieces produced
	Labor losses
Scale - -	Pieces produced
	Labor losses
Grind - -	Pieces produced
	Labor losses
Chip - -	Pieces produced
	Labor losses
Test - -	Pieces produced
	Labor losses

Total loss
Labor loss - Defective castings
Total labor loss
Total labor cost
Pieces shipped.

The original copy of this summary will be forwarded to the foundry management for its study and guidance in the continued operation of the foundries. Several situations requiring foundry attention may be disclosed through this report. For instance, a number of castings may be scrapped in the various labor operations for which no report is made. A record of excessive scrap may, upon investigation, be found to report a normal condition in respect of a particular pattern due to the requirements peculiar to such pattern. Also, castings may be paid for at the various labor operations in excess of the number of castings which could possibly have been worked on at those operations. If the labor loss is sufficient in amount and subsequent methods of production will not reduce or eliminate the labor loss, it may be necessary to revise the standard cost estimate of the casting, which may necessitate an upward revision in the selling price of the casting.

The summary forms recording the labor losses on completed casting orders should be numbered and the totals on the forms should be forwarded to obtain the total labor losses by operations for the four-week accounting period.

The information recorded on the summary sheets of completed casting orders should be recorded for permanent historical reference onto a permanent record by patterns, preferably onto the permanent pattern record, recording the following information: Labor loss report number; labor loss; labor loss—defective work; total labor loss; total labor cost.

If this information is recorded on the pattern record, it will provide the means of reviewing foundry experience on previous casting orders which should prove helpful in effectively controlling the labor cost of the current casting order.

German Foundry Produces 60 Ton Castings For Paper Drying Cylinders

CASTINGS WEIGHING UP TO 60 TONS for use in paper drying cylinders produced in Germany by the J. M. Voith firm, Heidenheim, are described in a report now on sale by the Office of Technical Services, Department of Commerce. The report was prepared following an OTS sponsored investigation in Germany.

The shell for one of the larger paper dryers required two ladles of approximately 30 tons each. The entire casting was poured in less than one minute. Composition of the charge was 30 per cent steel, 20 per cent silvery iron, and 40 per cent pig iron (to raise the phosphorous content).

The tensile strength of the dryer was 28,500 to 35,500 psi and the bending strength 57,000 to 71,000 psi. Brinell hardness was between 200 and 220. Temperature of metal during pour was 1200 to 1290 C.

The casting remains in the mold two days before removal to insure uniform cooling and elimination of possible stresses. After a preliminary cleaning of inner and outer surfaces, both surfaces are machined to obtain uniform wall thickness and even heat radiation. After mounting the shell on the dryer heads, another cut is taken across the outer surface, followed by careful grinding and polishing that may continue for several weeks before the surface meets accepted standards. The largest dryer built by the German firm had a diameter of 16 ft, a face of 15 ft and a total weight of 72 tons.

Orders for Report PB-85139, 21 pp., mimeographed, 75 cents, should be sent to the Office of Technical Services, Department of Commerce, Washington 25, D.C.

Form Foundry Industry Committee To Advise On Wartime Procurement

Recalling the important role of castings in the recent war, the Munitions Board and the Iron and Steel Industry Advisory Committee have recommended the establishment of a separate Foundry Industry Advisory Committee to advise on wartime castings procurement problems. The move was instigated by the National Castings Council, which was formally organized in Cleveland on January 15 by representatives of the American Foundryman's Society and other organizations of foundrymen, of equipment manufacturers, and of supply manufacturers.

Concerned with the problem of an adequate supply of materials in case an emergency should develop, the Munitions Board is surveying the nation's manufacturing plants to determine type of products, potential production, and war conversion possibilities. A perpetual inventory of production capacity is expected to simplify supply problems by enabling plants to deal with a minimum number of branches of the armed services and government agencies.

All of the more than 82,000 manufacturing plants which produced war materials during the recent war will not be included in the Munitions Board survey. Therefore, plants are urged to do their own planning, using as a pattern a 48-page booklet entitled *Guide for Joint Industry-Military Procurement Planning*. Copies can be obtained from the Board or from regional procurement offices of the various armed services.

MASS PRODUCTION OF PRECISION CASTINGS

PRECISION INVESTMENT CASTING on a mass production basis, an offshoot of wartime requirements for high temperature resistant alloys to be used in aircraft turbo-supercharger buckets, is now providing parts for locomotives, steam turbines, heavy duty electrical equipment, industrial sewing machines and water jet nozzles at the new West Allis foundry of the Allis Chalmers Manufacturing Co., Milwaukee, Wis.

The new foundry, in operation for less than a year, produces precision castings by means of the familiar lost-wax process, simplified to the greatest possible extent and using a minimum of complex equipment.

Among the many precision casting development projects currently being carried out at the foundry is the casting of blades for a coal-burning locomotive gas turbine. Made of S-590 high-temperature alloy, these complicated shapes are being cast to extremely high standards of accuracy and surface finish. The largest of these blades is about 10 in. long and $3\frac{1}{2}$ in.

Top, left: Die parts, wax pattern and finished casting for an 8-lb rotor, one of the largest castings produced at the new West Allis foundry. Patterns are removed by retracting the individual die segments forming the rotor blades. Below, left: Injection molding of patterns by means of a specially developed wax injection machine. Dies are clamped in pneumatic press controlled by a foot pedal. Wax is pumped to dies through flexible, water-jacketed hoses and standard fittings.

Starting left: (1) Applying the primary investment dip coat of fine silica and sodium silicate. This coating will form the inner surface of the mold after the wax has been melted out. (2) Applying silica to pattern group from motor operated silica sifter (3) Assembly of flask and pattern group (4) Filling the flask with investment mixture. Flasks are then put on vibrating table to settle and pack the investment firmly around pattern group.

wide, making it probably the largest blade to be successfully cast in a precision foundry.

The largest production casting yet made at the West Allis foundry is a 10 lb stator disc with integrally-cast blades, done with such accuracy that no machining is required on the contour of the 29 blades on the inside diameter of the stator nor on the 30 blades on the outer periphery of its 8 lb companion rotor.

Wherever possible, standard foundry technique is used in the production of precision castings. Machines have been eliminated in places where they complicate production needlessly, as in pressure or centrifugal casting of metals. However, in instances wherein the use of machinery speeds production and reduces costs, the machines have been highly developed.

Survey Proves Value of Method

The West Allis foundry came into being as the result of a survey conducted by the company to determine whether or not knowledge derived from wartime precision casting operations could benefit Allis-Chalmers' postwar products. The results of the survey proved so favorable to the further development and research of precision castings that the new foundry was established at the West Allis Works. Today, the foundry is capable of pouring approximately 100 lb of metal per hour, and if necessary can increase its output to 300 lb per hour.

In the lost wax process, patterns are produced by the injection of wax into metal dies. Patterns so formed are assembled on wax sprues and a refractory material is poured around them and allowed to harden. The wax is then melted from the mold, leaving a cavity into which metal is poured to form the castings. When the castings have been cleaned, they are cut free of the gating system and smoothed at the gate by grinding.

The plant does not normally make the metal patterns or dies it uses, but has a completely equipped machine shop for re-working and maintaining dies and for making experimental and developmental dies. Although fabricated dies are used to a considerable extent the shop is equipped to cast metal dies.

After considerable experiment, wax has been standardized on as a pattern material because it has been found preferable to present plastics from the standpoint of lower injection pressures and better shrinkage control. Wax is compounded and melted for all machines at a central point just outside the wax pattern room. Here reclaimed wax is molded into sprues.

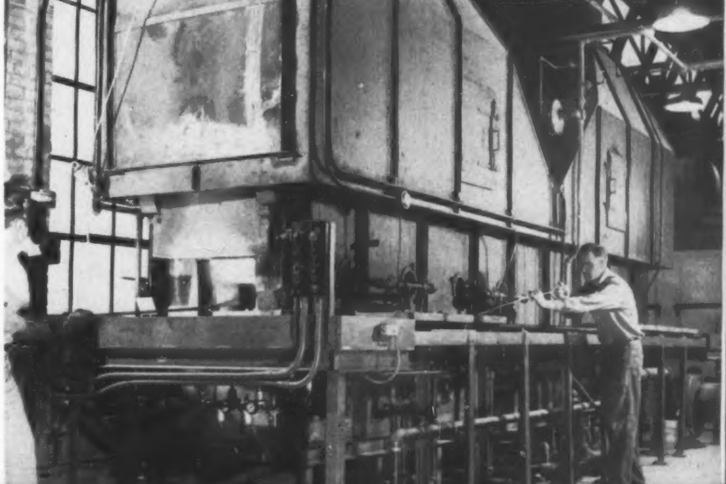
The wax injection apparatus is of three types. Several of the gun-type injectors used at the supercharger plant during the war are still in use for short runs and developmental work. These resemble grease guns and are filled from a container of soft wax. They are then placed in a jig where the nozzle of the gun fits into the die. A pneumatic ram bears against the gun handle to provide injection pressure.

A second type of machine, developed at this foundry, has a central wax storage container from which wax is pumped under pressure through flexible hoses to the injection nozzle. The machine's storage tank, pump and hoses are surrounded by water jackets in which water is circulated at a thermostatically-controlled temperature, insuring a constant supply of wax at correct injection temperature at the injection nozzles.

By bringing the wax to the die through the hose, rather than requiring the die to be mounted in the machine, this injector places no restrictions on die size, position, or mounting. Dies are usually held in a pneumatic clamp operated by a foot pedal. Connection between the injection nozzle and the die is made through standard fittings.

For mass production work a third machine has been designed. This machine is almost completely automatic in its operation. After the operator pushes a button to start the cycle, the closing of the dies, injec-

Molds make a 5-8 hour trip through this gas-fired pusher furnace to complete the operation of de-waxing and to preheat the molds prior to pouring.



Adding an alloying element to the charge in an induction furnace. This 9600 cycle, 30 kva furnace holds about 35 lb of metal. After melting down, the metal is transferred to the preheated molds on the pouring table by means of a ladle.

Pouring the metal. The ladle pictured here holds the combined charge from a 9600 cycle induction furnace, and is capable of filling as many as five molds in one pouring. Standard gravity head pouring is used almost exclusively.

tion, time delay for wax cooling, refilling of the wax gun, and opening of dies takes place automatically.

The machine is equipped with an air cylinder which can be attached to appropriately designed dies for core pulling. This cylinder does not operate as a part of the automatic cycle, since normally the horizontal cores serve to lift the completed patterns from the lower half as the dies separate, and to hold the pattern until the operator is ready to remove it.

A separate pushbutton is provided to actuate the core puller as the operator removes the pattern. Besides being designed for this automatic ejection of the patterns, dies are constructed with water channels for connection to a cooling water circulation system. The only manual operations remaining after removal of the pattern are lubrication of the die and pushing a button to start the next cycle.

From the injection machines, patterns are taken to tables for inspection and assembly. At these tables, the individual patterns are attached to wax sprues with the aid of heated tools and melted wax. Sprues are specially designed for each type of pattern to give proper support to the patterns in the flask, to leave passages for drainage of the wax as it melts out, to get the maximum number of patterns in the flask, and to provide passages for proper distribution of metal to give sound, dense castings.

Flasks are placed sprue end down on steam table, where the steam melts out most of the wax pattern group.

Two Investments Coat Patterns

Each assembled set of patterns is dipped in a primary investment slurry composed of very fine silica and a sodium silicate binder. Before this coating dries, a slightly coarser silica is sifted over it to strengthen the coat and to provide a roughened surface to which the secondary investment will adhere.

The secondary investment, consisting of ground firebrick, silica sand, and a small percentage of magnesium oxide, is blended in the dry state and piped to a rotary mixer to be combined with liquid silicate binder.

Molds are prepared by fastening a pattern group to a bottom plate with wax, setting the 18-8 steel flask lined with waterproof paper over the pattern and sealing the flask to the plate with wax.

The flask is then filled with the secondary investment and set on a vibrating table for 30-45 minutes to settle and pack the investment completely around the pattern group. Vacuum treatment to prevent small surface bubbles is not necessary, since the pattern surface has already been coated with the primary investment. This two-coat system also enables a fine grade of investment to be used to form the surface of the cavity into which the metal will be poured, while a less expensive and more permeable material can be used to fill flasks.

After vibrating, surface liquor is decanted and the excess paper is cut away before the flasks are stored to permit the investment to set.

Preliminary wax removal is accomplished on a steam

table. The bottom plate of the flask is removed and the flask is set over a hole on the table. Most of the wax melts out and is collected for re-use in sprues. The flasks then make a 5-8 hour trip through a gas-fired pusher oven, where three zones of temperatures ranging from 200 F to 1800 F volatilize the remaining wax and pre-heat the mold for pouring.

After removal from the oven, flasks are set on a pouring table, which can be rotated to bring each flask to the most convenient pouring position. Metal is melted in 30 kva, 9600 cycle induction furnaces, each holding about 35 lb, and is transferred to the molds by ladle.

Use Standard Gravity Head Pouring

Standard gravity head pouring is used almost exclusively, although for certain special designs having very thin sections, vacuum pouring may be used. Since these pouring methods do not limit the amount of metal melted at one time, comparatively large batches can be melted, making accurate metallurgical control possible. In addition, complicated pressure or centrifugal casting equipment is not needed.

After cooling for about five hours, castings are knocked out of the flask by air hammer. Remaining investment is removed in standard foundry blast cleaning equipment. The individual castings are cut from the group with a special bandsaw which uses a standard blade, but which operates at very high speeds and is capable of cutting almost any metal. For thick sections of the harder metals, friction saws are available.

Minor imperfections are removed and roughness at the gate is smoothed over in a variety of different sizes and types of grinders, and the part is then ready for inspection. Visual and dimensional inspection is given all parts, and plant facilities are available for all types of chemical and physical tests, and x-ray inspection when desired.

The elimination of many or all machining operations when a part is precision cast is demonstrated dramatically in a grater now being produced for a high-speed vegetable juicing and pulping machine. On the face of this three-inch stainless steel disc, 420 teeth are formed with points sharp enough for use as cast, eliminating complex machining and grinding operations otherwise required.

Cutting individual castings from the casting group with an ordinary blade operating at speeds much higher than normal. Friction saw is used for thick sections of harder metals.

A.F.S. Precision Casting Publications

PRECISION CASTINGS, by the A.F.S. Precision Castings Committee. To be published in book form in 1948.

"Principles of Precision Investment Castings," by Kenneth Geist and Robert M. Kerr, Jr. Official A.F.A. Exchange paper to the 44th Annual Conference of the Institute of British Foundrymen, Nottingham, England, 1947.

"Equipment Trends in Precision Casting," and *"Industrial Status of Precision Castings,"* vol. 53, A.F.A. TRANSACTIONS.

Saw cut is smoothed with this high speed, air-driven grinder, one of a large variety of different sizes and types of grinders. Part is now ready for visual and dimensional inspection, including x-ray inspection.

Final inspection of castings. Groups on table are representative of the wide variety of precision castings made at Allis-Chalmers' West Allis Foundry.

DEVELOP CHEMICAL METHODS FOR FASTER SAND ANALYSIS

R. A. Willey
and
J. B. Caine

Lengthy procedures for chemical analysis of sand have been a factor limiting the amount of research done on mold-metal interface reactions. The short accurate procedures described are expected to stimulate investigations into penetration, burnt-on sand, and other related foundry problems. Chemists and metallurgists are invited to try the methods reported and submit written discussion of results.

An unbiased reader of the literature on the properties of foundry sands must be quite surprised at the almost total lack of information as to their chemical composition. True, the sand producers usually have the analyses of their sands at hand, but practically no work has been done on the chemistry of the sands as used in the foundry. This is especially true of reclaimed sands, whose behavior is known to change with use. There must be a chemical change causing, or at least accompanying, this change in behavior.

In the past all evaluation of foundry sands has been based on mechanical properties at room temperatures. More recently, those properties operative at elevated temperatures have come under study. These physical tests have resulted in information as to how the sand reacts under these tests, but tell nothing as to why a particular sand behaves in a particular manner.

Many times the answer to this "why" can be obtained only by chemical analysis—what and how much is present in the sand that makes it behave as it does. At room temperature, with a few exceptions, the importance of chemistry in comparison with purely physical properties is perhaps minor. At the more important elevated temperatures, the role of chemistry in determining why the sand behaves as it does assumes much greater importance.

Present Methods Are Difficult

It appears that the two major reasons for the lack of work on chemical analysis of foundry sands are the difficulty and complexity of the analytical procedures now used and past experience of poor correlation between chemical analysis and the behavior of the sand when in contact with liquid metal in the foundry. Present analytical procedures for the analysis of sands are based on those established for silicious rocks and are not only time-consuming, a complete analysis requiring several days, but are also based on qualitative procedures in which each element is separated successively from the same sample. After the first few separations, unless the procedure is carefully conducted, the analyst begins to question how much of the element being determined was present in the sample and how much came from the reagents and glassware used in the preceding separations.

It is the purpose of this paper to simplify and speed up as much as possible the determinations so that they are adaptable to the equipment, skill and time of the average foundry analyst. Most of the procedures are no more difficult or time-consuming than those for manganese, silicon or chromium in ferrous metals. All procedures are based on separate samples, not only to speed up the complete analysis, but also to minimize the blank, as the elements being determined are those present in the largest amounts in the glassware, reagents and water used in the procedures.

The second deterrent to chemical analysis of foundry sands, that of lack of correlation between the chemistry and behavior in the foundry, is decreasing rapidly with recent knowledge. One big stumbling block in the proper appreciation of chemical analysis has been the almost universal belief that so-called "burnt-on" sand is due to fusion, and that a refractory sand analyzing high in SiO_2 should peel perfectly from the casting. The fact that these refractory sands did result in severe cases of burnt-on sand has caused some loss of confidence in chemical analysis of foundry sands.

Work by one of the authors [1] has cleared up this point in showing that so-called burnt-on sand is in reality adhering sand due to penetration, and in most instances due to pure mechanical penetration into voids present in the sand as rammed. Refractoriness plays a minor role in these sands; in fact, in many instances the high SiO_2 refractory sands are too refractory, do not glaze and are most prone to pure mechanical penetration of the metal into the sand, with severe adhering sand problems resulting.

Proper Sampling Is Important

Another reason for the poor correlation between chemical analysis and behavior of the sands in the foundry is poor sampling practice. It has been shown [1] that the location of the impurities is just as important as the amount present. Impurities present in the A.F.A. clay fraction are not nearly as important as those present in the A.F.A. silica fraction. In fact, in many instances the same amount of impurity that would ruin a sand for high temperature use if present in the A.F.A. silica fraction can be beneficial if present in the A.F.A. clay fraction. An example is that of

sodium oxide (Na_2O); small amounts present in the A.F.A. silica fraction as feldspar will make the sand worthless for steel foundry use. About the same amount of Na_2O present in the A.F.A. clay fraction in bentonite has proved beneficial in promoting a glaze on the mold surface in contact with liquid steel.

It is therefore mandatory in most cases to separate the sand into the A.F.A. silica and clay fractions and determine the chemical analysis of each. If this is not done the analytical results may be worthless.

The following procedures have been selected as the most adaptable to the foundry laboratory. They are not necessarily the most accurate because at the present time accuracies to even the first decimal point are meaningless. Much knowledge must be acquired before the significance of a variation of 0.1 per cent in a component can begin to be discussed. All methods given are accurate to plus or minus 0.1 per cent; most are accurate to plus or minus 0.01 per cent.

It should be emphasized that these procedures are advanced for trial and discussion. One of the authors' prime reasons for writing this paper is to stimulate discussion, which it is hoped may bring forth other methods, or further simplification of the methods advanced for the rapid routine analysis of foundry sands.

Stress Care in Sampling

The importance of proper sampling cannot be emphasized too strongly. Sand is a heterogeneous material, unlike metal. The average foundryman, accustomed to the almost automatic sampling procedure of drilling a piece of metal, does not appreciate the precautions necessary in sampling a heterogeneous material such as sand. Unless the sampling is properly carried out the sample is not representative, and no matter how accurately the analytical procedures are performed the results will be false and misleading.

Samples from cars, sand heaps, or conveyor type sand systems should be obtained according to Section 2 of the FOUNDRY SAND TESTING HANDBOOK.[2] The sample should be dried at 105–110 C. Unless the analyst is certain from previous experience that separation of the A.F.A. silica and clay fractions is unnecessary, this separation should be made according to Section 9 of the FOUNDRY SAND TESTING HANDBOOK,[2] except that no sodium hydroxide be added and the A.F.A. clay fraction caught in an open type filter paper. It is not necessary that all the A.F.A. clay be caught on the filter, only enough to insure a representative sample. The siphoning can then be continued until all of the A.F.A. clay has been separated from the A.F.A. silica.

Both fractions should be dried at 105–110 C. for one hour. The A.F.A. silica fraction should be weighed to determine the amount of A.F.A. silica and clay.

A quantity of the A.F.A. silica fraction sufficient for the contemplated analyses, or of the dried sand if separation of the silica and clay is not made, should be crushed to pass a 100-mesh screen. It is important that all of the sample be crushed to pass through the screen; otherwise the harder particles will be discarded and a nonrepresentative sample result.

Although the various procedures and standard solutions can be standardized theoretically, it is recommended that the standards developed by the National Bureau of Standards be used. National Bureau of Standards Silica Brick No. 102, Plastic Clay No. 98, and Soda Lime Glass No. 80 are useful in this respect.

It is necessary to run blanks on practically all of the determinations except loss on ignition and carbon. As was mentioned previously, the elements being determined are those most likely to be present in the largest amounts in the glassware, reagents and water used. Distilled water is mandatory.

Loss on Ignition

The importance of the loss on ignition determination has been overlooked. This test not only gives information as to the chemically combined water and amount of organic material present, but if combined with the determination for carbon yields information as to the amount of carbonates present.

Procedure: Weigh about 5 g of sample into a weighed, ignited porcelain crucible. Heat to about 875 C for 1 hr, preferably in a furnace. Cool in a dessicator and weigh.

$$\frac{\text{Loss in Wt.}}{\text{Wt. of Sample}} \times 100 = \% \text{ Loss on Ignition at 875 C.}$$

Carbon

Another important constituent that is too often overlooked, especially in reclaimed sands, is the carbon. This determination when made on sands as received yields information on the amount of organic material and carbonates present. It can be used to estimate and control the amount of seacoal and cereal contents of the sand as used in the foundry, as well as any other organic materials added or formed in the sand.

It is not necessary, on most sands, to pulverize or separate the sand into the A.F.A. silica and clay fractions for this test.

Procedure: Any combustion procedure used for carbon in iron and steel is applicable. Accelerators or extremely high temperatures are not required.

Iron Oxide

With the growing appreciation of the benefits of iron oxide as an addition to sand, the amount actually present in naturally bonded and production sands in the foundry assumes equal importance. This analysis should, in the future, become a routine control procedure.

Iron oxide should always be determined separately in the A.F.A. silica and clay fractions, as the amount present in the A.F.A. silica fraction is much more effective than that in the A.F.A. clay fraction. If this element is to be determined in used ferrous sands, as much metallic iron as possible should be removed with a strong magnet. This magnetic separation, unfortunately, is not 100 per cent effective, and this fact should be kept in mind when drawing conclusions from the analytical results.

Procedure: Dissolve a 0.550-g sample with 30 ml concentrated HCl and 15-25 drops of HF in a 200-ml Erlenmeyer flask. Wash down the sides of the flask and then add a 2.5 per cent $KMnO_4$ solution until a distinct pink or brownish color appears.*[1] While hot (nearly boiling) add a stannous chloride solution dropwise and with stirring until the color of the ferric iron is discharged and then add just one more

*[1] Superscripts preceded by an asterisk refer to numbered notes at end of analytical procedure.

drop.*[2] Cool. Add at one stroke 10 ml of saturated mercuric chloride. Stir, wash down the sides of the flask with cold water and allow to stand 2-5 min. Titrate the iron with standard potassium dichromate as follows:

Transfer to a 500-ml beaker containing 300-350 ml of water. Add 25 ml of titrating solution and add 3 drops of diphenylamine indicator solution.*[3] Titrate with standard potassium dichromate solution *[4] to a permanent end point. Near the end point the green color deepens to a blue-green or grayish blue. Now add the dichromate dropwise until the color changes to an intense violet-blue.

One ml standard dichromate equals 0.002 g Fe_2O_3.

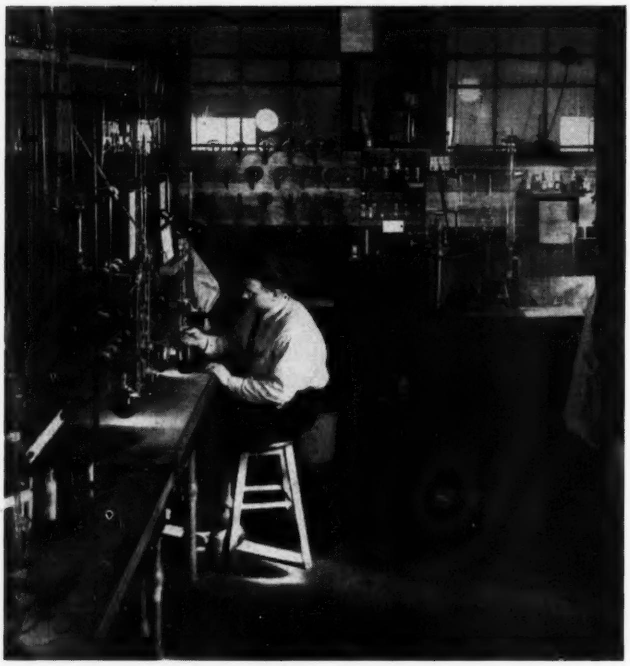
A blank must be run on the chemicals and deducted.

Notes: 1. Always treat the solution with $KMnO_4$ before reducing iron with stannous chloride. This precaution should always be taken because of the possible presence of organic matter. If organic matter is present, more or less ferric chloride will be reduced, causing high results.

2. A large excess of stannous chloride will ruin the determination unless most of it is reoxidized. In case of doubt the color of the ferric chloride must be restored by adding $KMnO_4$ and the reduction with $SnCl_2$ repeated more carefully.

3. Sodium diphenylamine sulphonate indicator can be used in place of diphenylamine. Too large an excess of mercuric ions does not interfere with its use; the color change is brilliant and the end point very sharp. It can be purchased prepared from any laboratory supply house.

4. Potassium dichromate has the advantage of having no fading end point as is often obtained in the potassium permanganate titration of iron in the presence of mercuric chloride. However, if only an occasional Fe_2O_3 determination is to be made and standard $KMnO_4$ is available, it can be standardized and used for this determination.



Student conducting sand analysis in corner of foundry control laboratory at University of Minnesota.

Solutions: ***Titrating Solution.*** 150 ml sulphuric acid (sp gr 1.84), 150 ml phosphoric acid. Dilute to 1000 ml. Add the 150 ml of sulphuric acid slowly and with stirring to 500 ml of water. Add the syrupy phosphoric acid and then dilute to one liter.

Stannous Chloride. Dissolve 150 g of stannous chloride in 300 ml of hydrochloric acid and dilute to 1000 ml with water.

Mercuric Chloride. Saturated solution of mercuric chloride in water.

Diphenylamine Indicator. Dissolve 1 g of the reagent in 100 ml of sulphuric acid. A color change to brown does not impair the usefulness of the diphenyamine indicator.

Standard Dichromate Solution. Dissolve 1.2260 g of pure recrystallized potassium dichromate in water and dilute to exactly 1000 ml. 1 ml is equivalent to 0.0020 g Fe_2O_3. The solution may be standardized against pure iron or standard silica brick.

Calcium Oxide

Calcium oxide is another component of sand whose behavior depends on whether it is present in the A.F.A. silica or clay fraction. Its presence in the silica fraction many times denotes the presence of feldspar. Its presence as calcium carbonate can be estimated in conjunction with loss on ignition and carbon content; however, to be certain, a carbonate determination is required. This compound is present in small amounts in a number of clays and in surprisingly large amounts in the A.F.A. silica fraction of many iron foundry and nonferrous sands.

Procedure: Weigh a 0.500-g sample and transfer to a 200-ml Erlenmeyer flask. Dissolve in 20 ml 70 per cent perchloric acid*[1] and 5 ml hydrofluoric acid by heating until fumes of perchloric acid reflux on side of flask. Cool and dilute to 50 ml. Make solution ammonical with ammonium hydroxide.*[2] Transfer solution to a clean 400-ml beaker and dilute to about 200 ml with hot water. Bring to a boil and add 40 ml of ammonium oxalate slowly with constant stirring, add 1 g solid oxalic acid and boil for 3 min. Let precipitate settle.

After precipitate settles filter off calcium oxalate through an open paper (Whatman 30) and wash free of acid with hot water. Wash precipitate back into original beaker and hang folded filter paper on edge of beaker. Add 30 ml of 1:1 sulphuric acid and dilute to 300 ml with hot water. Maintain the solution at about 80 C and titrate with standard potassium permanganate until the solution turns faintly pink. When end point is reached, drop paper into solution, break up paper, rinse down the beaker and quickly finish the titration. One ml of 0.0178 N $KMnO_4 = 0.0005$ g CaO.

Run blank on reagents.

Notes: 1. *Caution! Observe all precautions in the use of perchloric acid!*

2. A slight precipitation of iron and aluminum hydroxide does not interfere with the determination.

Solutions: ***Ammonium Oxalate.*** Saturated solution (4 per cent).

Standard Potassium Permanganate. Dissolve 0.6000 g $KMnO_4$ in about 500 ml of hot water and

let age 24 hr. Dilute to exactly 1000 ml. Standardize against Bureau of Standards sodium oxalate according to the directions accompanying this standard.

Sodium Oxide

Oxides of sodium and potassium are highly detrimental in sands for high-temperature use if present in the A.F.A. silica fraction. It has been shown [1] that the presence of as little as 0.5 per cent of these oxides in the silica fraction will cause an appreciable increase in penetration with steel sands. On the other hand, the presence of this element in the A.F.A. clay phase can be beneficial in promoting a glaze.

It is, therefore, imperative that the sand be separated into A.F.A. silica and clay fractions before analysis or the results will be meaningless and misleading.

The method given is not only fast but accurate, and is adaptable to the determination of small quantities of this element. The final precipitate contains only slightly more than 2 per cent of sodium, and often weighs more than the original sample.

Procedure: Weigh a 0.500-g sample into a small platinum dish containing 5 ml hydrofluoric acid, 5 drops concentrated hydrochloric acid. Heat to boiling and boil as rapidly as possible until contents become syrupy and there is danger of spattering. Decrease heat, evaporate to dryness, but do not bake.

Place dish and contents in a 50-ml beaker containing 25 ml water, 10 ml concentrated hydrochloric acid. Heat to boiling. When contents have dissolved, remove and wash dish. If solution is not perfectly clear at this point filter through a close qualitative paper, wash paper with minimum amount of water. Evaporate to 3 to 5 ml, *not over 5 ml,* cool.*[1]

Add 50 ml zinc uranyl acetate solution. Stir and allow precipitate to settle. Filter through a weighed porous crucible under suction. Wash five times with 95 per cent alcohol saturated with sodium zinc uranyl acetate precipitate, using 3-ml portions. Pass air through the filtering crucible for a few minutes, wipe off the outside of the crucible, allow to air dry at room temperature for a few minutes, weigh.*[2]

$$\text{Weight} \times 0.0202 \times 2 \times 100 = \%\ Na_2O.$$

Run blank on reagents.

Notes: 1. The solution must be concentrated to not over 5 ml before the addition of the zinc uranyl acetate solution. As the precipitate is soluble in water the solution must be as low in water as possible. If more than 50 mg KCl per ml of solution are present the potassium should be separated first. Lithium and strontium interfere.

2. If the precipitate is heated before weighing, some water of crystallization is lost and a different factor must be used. The factor is consistent at any given temperature. At 45 to 50 C it is 0.0256.

Solutions: ***Zinc Uranyl Acetate Solution.*** Solution *A*—10 g uranium acetate, 6 g 30 per cent acetic acid, 65 ml water. Solution *B*—30 g zinc acetate, 3 g 30 per cent acetic acid, 65 ml water. Warm to dissolve. Mix solutions *A* and *B*. Let stand 24 hr.

Potassium Oxide

The same comments apply to this element as to sodium oxide. It is again imperative that the sand be separated into A.F.A. silica and clay fractions. The analyst must be warned even before reading the procedure that he is making an organic addition to concentrated perchloric acid. Although the authors have performed this determination many times without trouble, warning should be given that this mixture must be made at room temperature or below, using all the known precautions in handling a mixture of perchloric acid and volatile organic solvents.

Procedure: Weigh 0.500-g sample into a small platinum dish containing 5 ml hydrofluoric acid, 5 drops concentrated hydrochloric acid. Heat to boiling and boil as rapidly as possible until contents become syrupy and there is danger of spattering. Decrease heat, evaporate to dryness, but do not bake. Place dish and contents in a 250-ml beaker containing 25 ml water, 10 ml concentrated hydrochloric acid. Heat to boiling. When contents are dissolved remove and wash dish. Add 10 ml 70 per cent perchloric acid, boil until copious fumes of perchloric acid are evolved, but do not evaporate to dryness. If the solution is not perfectly clear at this point, cool to room temperature, filter through a close qualitative paper, wash with minimum amount of water, add 5 ml perchloric acid and again evaporate until fumes of perchloric acid are evolved.

Cool to room temperature or below, add 20 ml of a mixture of equal parts of anhydrous butyl alcohol and ethyl acetate *(warning, see the following note)*. Stir, and allow precipitate to settle.

Filter through a weighed porous crucible under suction, wash with the butyl alcohol-ethyl acetate mixture. Dry for a few minutes at 110 C, weigh.

$$\text{Weight} \times 0.3399 \times 2 \times 100 = \%\ K_2O.$$

Note: The addition of the butyl alcohol-ethyl acetate mixture should always be made at room temperature or below, *never if the solution is even slightly warm.* The analyst should protect himself against explosion with suitable shields from this point until the disposal of the filtrate.

Silica

The determination of this oxide is of more importance in the A.F.A. clay fraction than in the A.F.A. silica fraction; in fact, SiO_2 is seldom determined in the A.F.A. silica fraction, even though it is the most predominant oxide. The same reasons apply for not making this determination in the silica fraction as apply for not determining Fe in iron and steel.

The procedure given may [illegible] slightly high results for high-silica sample[illegible] are very resistant to acid attack. However, it is so fast that, unless extreme accuracy is required, it is recommended. If extreme accuracy is required use the standard determination for SiO_2 by fusing with sodium carbonate.

Procedure: Weigh 0.500-g sample into a 250-ml beaker, add 10 ml water. Shake well to prevent caking and heat to boiling. Add 10 ml concentrated hydrochloric acid, 15 ml 60 per cent perchloric acid, 5 ml concentrated nitric acid. *Caution!* Boil to copious perchloric fumes. Cool, add 5 ml concentrated hydrochloric acid, boil for 3 min and add 50 ml hot water. Filter through an open quantitative paper, using suction if necessary. Wash twice with hot 1:1 hydrochloric acid, five times with hot water. Ignite in a weighed porcelain or platinum crucible, cool and weigh.

$$\text{Weight} \times 2 \times 100 = \%\ SiO_2.$$

Note: *Observe precautions in use of perchloric acid!*

Aluminum oxide is always present in the A.F.A. clay fraction and in much larger amounts than in the A.F.A. silica fraction. Its estimation is more important in the clay fraction, for no detrimental results are known that can be attributed to this oxide's presence in amounts of 1 or 2 per cent in the A.F.A. silica fraction. It is, therefore, imperative that the sand be fractioned into A.F.A. silica and clay before analysis.

Alumina

Procedure: A sample of sand (1 g) is weighed into a platinum dish and 20 ml hydrofluoric acid and one ml sulphuric acid are added and evaporated on a hot plate. If the sample be clay, use a proportionately smaller sample. Fume off the sulphuric acid, ignite or bake. Dissolve the residue in 20 ml of 1:1 hydrochloric acid. Transfer quantitatively to a 250-ml beaker, boil, and oxidize the iron by the addition of 5 ml of 1:1 nitric acid. If magnesium as well as aluminum is to be determined in the sample, use a 2-g sample and transfer the solution to a 200-ml volumetric flask and divide into equal parts or use an aliquot portion for each determination.

Add a 10 per cent sodium hydroxide solution until the solution is nearly neutralized. If a precipitate forms, dissolve in hydrochloric acid. Heat to boiling, then add dropwise and with constant stirring the neutral solution into a 500-ml beaker containing 80 ml of 10 per cent sodium hydroxide. If necessary, dilute to 150-200 ml and boil for one min. Let settle and filter through an open paper, catching the filtrate in a 500-ml beaker which has been washed out with hydrochloric acid and water. Wash precipitate three or four times with water.

Dilute, if necessary, to about 250 ml. Add 2-4 drops of bromcresol purple indicator. Add 10 ml of 10 per cent tartaric acid and follow with hydrochloric acid until color of the solution is yellow, then add 5 ml of hydrochloric acid in excess. Carefully add ammonium hydroxide until color of the solution turns purple, but on continued stirring returns to yellow color. Now add dropwise 1:15 ammonium hydroxide until the color of the solution turns purple.*[1] Add 10 ml 3 per cent hydrogen peroxide. Heat to about 50 C and add with constant stirring 10 ml of 2½ per cent 8-hydroxyquinoline, which generally causes a precipitate to form.

Careful Washing Essential

Continue the stirring and add 30 ml of 18 per cent solution of ammonium acetate in water and carefully add 0.7 ml of ammonium hydroxide. Stir 5 or 10 min, preferably with a stirring machine.*[2] Let stand in running water until solution has cooled and the precipitate has settled. Filter and wash 8-10 times with cold water. Be sure to carefully wash the top of the paper as any 8-hydroxyquinoline left on the paper will be titrated later as aluminum.

Transfer the filter paper to the original beaker to which has been added 40 ml of hydrochloric acid and 150 ml water. Heat to 75 C, or until the aluminum quinolate decomposes. Dilute to 350-400 ml with cold water and cool to room temperature. Titrate for aluminum as follows:

From a burette add standard bromate solution in excess.*[3] Stir for one min. Test solution to see if excess of bromate has been added by placing a drop of solution on a spot plate, add a drop of 10 per cent potassium chloride and one drop of starch solution. If drop turns deep blue an excess of bromate has been added. If it does not turn deep blue, add more bromate, stir for one min and test again. Now add to the solution 10 ml of 10 per cent potassium iodide,*[4] stir and titrate with standard sodium thiosulphate solution until the yellow color begins to fade, add 2-4 ml of starch solution *[5] and continue the titration until the blue color disappears.

To another beaker containing 40 ml hydrochloric acid and 350 ml water, add 25 ml bromate solution. Add 10 ml of 10 per cent potassium iodide and titrate with sodium thiosulphate solution as before. If the solutions are of equal strength or normality, the calculations are simple. If not, it is necessary to find the value of 1 ml of sodium thiosulphate as regards the bromate solution. To do this, divide the number of ml of bromate by the number of ml of thiosulphate used. For example, if 25 ml of bromate requires 24.4 ml of thiosulphate, the value of 1 ml of the thiosulphate is 25 divided by 24.4, or 1.024.

Calculations and Data: The reaction between aluminum quinolate and potassium bromate requires 12 bromine atoms to react with the aluminum. Therefore, a liter of normal bromate equals 1/12 of 26.97 g Al, or 1 ml equals 0.00022475 g Al, or 0.000425 g Al_2O_3. For example, if the data is as follows:

(1) The potassium bromate is exactly 1/10 N;
(2) The sodium thiosulphate is exactly 0.1007 N;
(3) 15 ml $KBrO_3$ = 14.9 ml of $Na_2S_2O_3$;
Therefore, 1 ml of $Na_2S_2O_3$ = 1.007 ml $KBrO_3$.
(4) Weight of sample is 0.500 g;
(5) 30 ml $KBrO_3$ added to the solution;
(6) 6.9 ml of $Na_2S_2O_3$ required to titrate the excess bromate added. The calculations for the percentage of Al_2O_3 in the sample may be done in either of two ways, namely:

A. Based on the normality of the $KBrO_3$: Multiply the ml of thiosulphate by the value of 1 ml of thiosulphate and deduct this value from the bromate added. Multiply this answer by the value of 1 ml of $KBrO_3$ and determine percentage of Al_2O_3. An example is as follows:

$KBrO_3$	30.00 ml
$Na_2S_2O_3$, 6.9 × 1.007	6.95 ml
$KBrO_3$ required to titrate Al	23.05 ml

$$\frac{23.05 \times 0.000425 \times 100}{0.5} = 1.96\%\ Al_2O_3$$

B. Based on the normality of the thiosulphate. An example of the calculations based on the foregoing data is as follows:

Since 15 ml $KBrO_3$ is equivalent to 14.9 ml, $Na_2S_2O_3$, 30 ml $KBrO_3$ is equivalent to 29.8 ml $Na_2S_2O_3$.

$$\frac{(29.8-6.9) \times 0.1007 \times 0.000425 \times 100}{0.5} = 1.96\%\ Al_2O_3$$

Notes: If the aluminum content of the sample is low, a blank should be run on the amount of sodium hydroxide used. The blank is very low and on a 1-g sample will be in the range 0.002-0.006 per cent Al_2O_3.

(1) It is imperative that this end point is not overrun. If it should be, add dilute hydrochloric acid until the solution is yellow and follow procedure very carefully until end point (purple color) is attained.

(2) If a stirring machine is not available, the solution may be allowed to stand overnight.

(3) The solution turns slightly yellow when an excess is added. Generally, 10-20 ml will result in an excess.

(4) An excess of iodide is used because (a) the reaction is more rapid and (b) starch will not give a blue color with free iodine unless an excess of KI is present.

(5) Care must be taken that the starch is not added until the iodine concentration is fairly low, as starch forms a difficultly soluble black precipitate with free iodine if the iodine concentration is too high.

(6) When the oxidation is finished, bromine is liberated and the indicator destroyed.

Solutions: ***10 Per Cent Sodium Hydroxide.*** Make up as needed by dissolving 10 g/100 ml water.

10 Per Cent Potassium Iodide. Dissolve 10g KI in 100 ml water.

Bromcresol Purple Indicator. This solution can be purchased prepared. If it is desired to prepare the solution, it can be done as follows: Weigh 100 mg of the indicator and transfer to a 250-ml beaker. Add 3.5 ml of 0.16*N* sodium hydroxide solution. Stir until dissolved and dilute to 100 ml.

8-hydroxyquinoline. Dissolve 5 g of the reagent in 10 ml acetic acid. Pour into 90 ml water at 60 C. Cool and filter.

Standard Sodium Thiosulphate. Dissolve 25 g of sodium thiosulphate in 500 ml water (boiled and cooled to room temperature). Add 0.1 g sodium carbonate. Dilute to exactly 1000 ml and standardize with potassium iodate as follows:

Dry sample of potassium iodate at 120 C for one hour. Weigh approximately 0.1500 g of KIO_3 and carefully transfer to a 250-ml Erlenmeyer flask. Dissolve in 50 ml of cold, recently boiled water. Add 30 ml of 10 per cent potassium iodide and then 15 ml of 1:10 hydrochloric acid. Titrate solution at once with sodium thiosulphate solution. When yellow color of the iodine has almost disappeared, add 1 ml of starch solution and continue titration to the disappearance of the blue color formed when the starch solution was added. Make at least two determinations of normality.

$$N = \frac{\text{wt. of } KIO_3 \times 6000}{\text{mol. wt. of } KIO_3 \times \text{volume of thiosulphate}}$$

As 1 ml of normal $KIO_3 = 0.035669$ g, the normality of the sodium thiosulphate can also be calculated as follows. The weight of the KIO_3 used divided by the number of ml of sodium thiosulphate required gives the weight of KIO_3 equal to 1 ml of sodium thiosulphate. This quantity divided by the weight of KIO_3 contained in 1 ml of a normal solution equals the normality. For example, if 0.1499 g KIO_3 required 41.4 ml of thiosulphate, then 1 ml is equivalent to:

$$\frac{0.1499}{41.4} = 0.003600 \text{ g } KIO_3$$

and

$$\frac{0.003600}{0.0356\,N} = 0.1010\,N$$

The sodium thiosulphate can be standardized against a standardized potassium bromate solution as described in the titration of aluminum, and also against a standard 1/10*N* potassium permanganate solution.

Standard Potassium Bromate. Weigh 2.800 g of $KBrO_3$ and transfer to a 1000-ml volumetric flask, add 2 g KOH and 9.9 g KBr. Dissolve and dilute to one liter. The solution is standardized against Bureau of Standards arsenious oxide as follows: For a 1/10 normal solution weigh 0.1978 g of arsenious oxide and transfer to a 600-ml beaker. Add 10 ml water and 5 ml of 10 per cent sodium hydroxide. Stir until dissolved. Add 75 ml concentrated HCl and and 325 ml water. Add a few drops of methyl orange indicator and then titrate with the potassium bromate solution slowly while stirring until the solution turns colorless. Add the last few drops very slowly before the end point.*[6]

Calculation for normality is similar to the method described under the standardization of sodium thiosulphate. For example, assume the titration requires 40.00 ml standard potassium bromate solution, then:

0.1978 g arsenious oxide is equivalent to 40.00 ml $KBrO_3$, therefore

$$1 \text{ ml } KBrO_3 = \frac{0.1978}{40.00} = 0.004945 \text{ g}$$

$$\text{Normality} = \frac{0.004945}{0.04945} = 0.1000\,N$$

Magnesia

Nothing is known as to the effect of magnesium oxide on the behavior of the sand in the foundry, although it should act as a flux, similar to the behavior of calcium oxide. Many times it will be found to be associated with calcium oxide. Perhaps interest in the determination of this oxide will lead to information as to its behavior in sands.

Procedure: A 1- or 2-g sample is weighed into a platinum dish and 20-25 ml of hydrofluoric acid and 1 ml of sulphuric acid are added. Evaporate to dryness. Fume off the sulphuric acid. Dissolve the residue in 20 ml of 1:1 hydrochloric acid and transfer quantitatively to a 400-ml beaker, heat to boiling and add 5 ml 1:1 nitric acid and boil off the nitrous fumes.

Add 2-3 drops of methyl red indicator and 2 g ammonium chloride. Add ammonium hydroxide dropwise until the color changes to yellow. Care should be used when approaching the end point. After end point is reached, add 2 drops of ammonium hydroxide in excess. Bring to boil and boil for not over ½ min. Filter and wash several times with hot water. Discard precipitate and catch filtrate in a clean (washed with HCl) 400-ml beaker.

To this filtrate add 5 drops of ammonium hydroxide. Heat to boiling and add 1 g solid oxalic acid. Solution should now be red to methyl red indicator. If not, add more oxalic acid. Add 40 ml of saturated solution of ammonium oxalate slowly and with constant stirring. Let precipitate settle. Filter off calcium oxalate.*[1]

Neutralize solution with ammonium hydroxide and add 5 ml in excess. Heat to about 70 C and add 5 ml of 2½ per cent 8-hydroxyquinoline with constant stirring.*[2] Heat to boiling, remove from heat and al-

low to stand 15-20 min.*[3] Filter and wash with 1:50 ammonium hydroxide.

Transfer the filter paper to the original beaker to which has been added 40 ml hydrochloric acid and 150 ml water. Heat to 75 C, or until magnesium quinolate is decomposed. Dilute to 350-400 ml with cold water, cool to room temperature and titrate for magnesium as follows:

Add from a burette standard bromate solution in excess. Stir for one minute. Test solution to see if excess of bromate has been added by placing a drop of the solution on a spot plate, add a drop of 10 per cent potassium iodide and one drop of starch solution. If drop turns deep blue an excess of bromate has been added. If it does not turn blue, add more bromate, stir one min and test again. Continue this testing until the test drop does turn blue. Now add to the solution 10 ml of 10 per cent KI, stir and titrate with sodium thiosulphate solution until the yellow color begins to fade, add 2-4 ml of starch solution and continue the titration until the blue color disappears.

To another beaker containing 40 ml hydrochloric acid and 350 ml water, add 25 ml of the bromate solution. Add 10 ml of 10 per cent potassium iodide solution and titrate with sodium thiosulphate solution as before. If the solutions are of equal strength or normality the calculations are simple. If not, it is necessary to find the value of one ml of thiosulphate as regards the bromate solution. To do this, divide the ml of bromate by the ml of thiosulphate required for the titration. For example, if 25 ml of bromate requires 24.4 ml of thiosulphate, the value of one ml of the thiosulphate is 25 divided by $24.4 = 1.024$.

A blank must be run on the chemicals and titrated with $KBrO_3$ and $Na_2S_2O_3$ solutions.

Calculations and Data: Calculate the percentage of Mg as follows:

$$\% \text{ Mg} = \frac{(A - B)\ C \times 0.00504}{D} \times 100$$

Where A = ml of thiosulphate required to titrate the blank

B = ml of thiosulphate required to titrate the sample

C = normality of the thiosulphate

D = weight of sample.

A normal solution of bromate equals $\frac{1}{8}$ of 24.32 g or 1 ml = 0.00504 g MgO.

Notes: (1) If desired, calcium can be determined at this point by washing the oxalate back into the original beaker, dissolving in 1:1 sulphuric acid and titrating with standard $KMnO_4$ as in the determination of CaO.

(2) The magnesium quinolate precipitate tends to occlude 8-hydroxyquinoline if a large excess of the reagent is added. The occluded reagent is not removed by washing and thus causes high results in the titration.

(3) The precipitate may be allowed to settle overnight.

Solutions: ***Ammonium Oxalate.*** Saturated solution (4 per cent).

10 Per Cent Potassium Iodide. Dissolve 10 g potassium iodide per 100 ml of water.

8-hydroxyquinoline. Dissolve 5 g of the reagent in 10 ml of acetic acid. Pour into 90 ml of water at 60 C. Cool and filter. Solution stable for 6 weeks.

Sodium Thiosulphate. Dissolve 25 g of sodium thiosulphate in 500 ml water (boiled and cooled to room temperature), add 0.1 g sodium carbonate. Dilute to 1000 ml and standardize as follows: Dry sample of potassium iodate at 120 C for one hour. Weigh approximately 0.1500 g of KIO_3 and carefully transfer to a 250-ml Erlenmeyer flask, dissolve in 50 ml of cold, recently boiled water. Add 30 ml of the 10 per cent potassium iodide solution and then 15 ml of 1:10 hydrochloric acid. Titrate solution at once with thiosulphate. When yellow color of the iodine has almost disappeared, add 1 ml of starch solution and continue titration to the disappearance of the blue color imparted by the starch. Make at least two determinations of normality.

The normality can be calculated as follows:

$$N = \frac{\text{wt. of } KIO_3 \times 6000}{\text{mol. wt. of } KIO_3 \times \text{volume of thiosulphate}}$$

An alternate method is as follows: As 1 ml of normal $KIO_3 = 0.035669$ g, the normality can be calculated as—the weight of KIO_3 used divided by the ml of thiosulphate required equals the weight of KIO_3 equal to 1 ml of thiosulphate. This quantity divided by the weight of KIO_3 contained in 1 ml of a normal solution equals the normality. For example, if 0.1499 g of KIO_3 requires 41.4 ml of thiosulphate, then 1 ml of thiosulphate is equivalent to

$$\frac{0.1499}{41.40} = 0.0036 \text{ g } KIO_3$$

and

$$\frac{0.0036}{0.0356\ N} = 0.1010\ N$$

The thiosulphate can be standardized against a standardized potassium bromate solution as described in the titration of aluminum in the alumina determination.

The thiosulphate can also be standardized against standard 1/10 N potassium permanganate.

Methyl Red Indicator. Dissolve 200 mg of methyl red in 60 ml of alcohol plus 40 ml water.

Conclusion

It is hoped that the procedures described in the paper will serve to establish chemical analysis of sands as a valuable tool in the foundry, and as an incentive to further investigation of chemical analytical methods and research into foundry sand problems.

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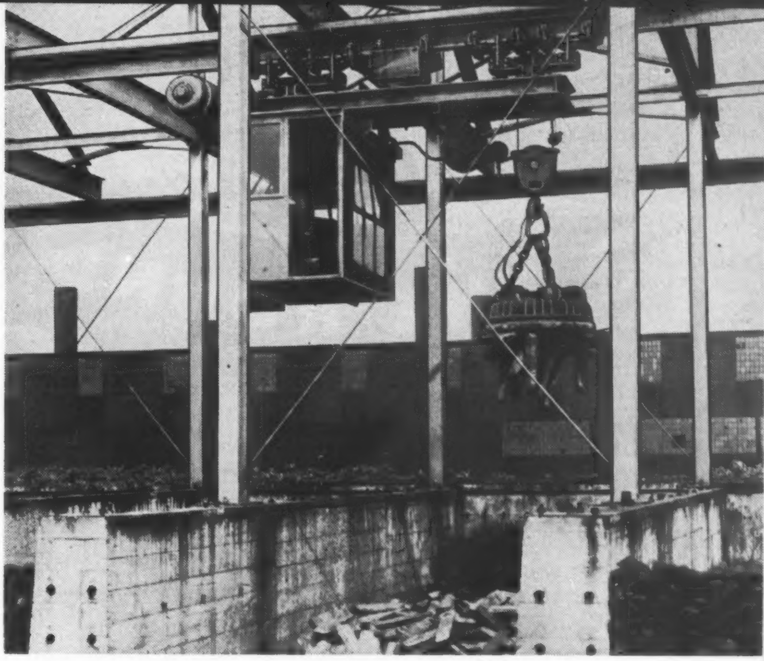
OVERHEAD MATERIALS HANDLING

An overhead monorail system recently substituted for manual on-the-ground handling operations at a modern Pennsylvania gray iron foundry has been responsible for reducing materials handling time and costs 86 per cent. In less than five hours, using the overhead system, one man is capable of unloading and storing the same amount of material as that formerly handled by three men in 1½ days. Reprinted from Modern Materials Handling, March.



The monorail carrier's electric hoist-operated, 1000-lb capacity electro-magnet releases the pig iron into the bins.

A MATERIALS HANDLING OPERATION that formerly required 36 hours has been cut to less than five hours at the Urick Foundry, Erie, Pa., by the installation of a new monorail system that substitutes overhead handling for on-the-ground manual hauling, according to Plant Superintendent Ralph J. Oboth.

Since the installation of the system, one man now handles carloads of scrap and pig iron that formerly required three men a day-and-a-half to unload and store in yard bins. The other two men are thus released for other operations.

The key to time and labor saving overhead handling operations at the Urick Foundry is a loop of heavy duty monorail track. The outside track is supported by cantilever suspension over the center of the railroad siding where loaded freight cars are received. Switches placed at each end of the inside track permit the carrier to run out in spurs over the cope storage area and at the cupola end of the loop.

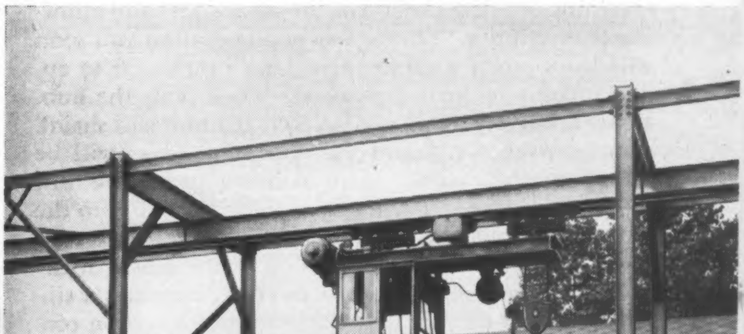
The carrier itself features a five-ton electric hoist with special rigging to permit safe operation of a 1000-lb capacity electric magnet. A rubber drive wheel incorporated in the cab roof propels the carrier along the rail.

As illustrated, the magnet is lowered into waiting cars, picks up a load of pig or scrap iron and carries it to the storage bins in the yard.

Along with the unloading and storing operations, the carrier also handles heavy iron copes, moving them in and out of storage in the yard by means of the magnet or sling chains. The monorail unit further proves its versatility by helping to break up scrap. This is accomplished by dropping a 1000-lb steel ball from the raised magnet onto the scrap in the bins.

Electric magnet, suspended over siding, dips into gondola car to pick up loads of pig or scrap iron.

Magnet lifts iron copes for transfer to and from yard storage points. Track runs above storage area.



Questions THE ROUND TABLE Answers

> The Round Table, newest department of American Foundryman, brings to foundrymen everywhere a variety of facts and opinions on current foundry problems. Sometimes The Round Table will provide information on a single problem; sometimes it will consist of some of the many questions and answers of broad interest which are handled regularly by your A.F.S. Technical Staff.
>
> In August, The Round Table will give a number of authoritative answers to the question: "How long does it take to train an apprentice?" The problem of carbon monoxide accumulation in foundries, especially in the winter, will be discussed in the September issue.

Has Trouble Casting Sheaves

We are having difficulty making sheaves with cast iron hubs and rims and low carbon steel spokes. The molds for the castings of the type shown on the enclosed blueprints are sectional dry sand cores. The cores are assembled with the spokes in place and metal at 2600 F is poured into the hub and rim cavities. The cupola charge consists of 300 lb pig iron (Si 2.45%), 300 lb scrap (Si 2.00%) and 400 lb steel. In spite of all precautions, many of these castings rupture during cooling, sometimes in the hub, sometimes in the rim.

In a wheel with an eight foot diameter, such as you are making, the stresses developed during solidification are very high. You can overcome this to a great extent by pouring the rim of the sheave first and allowing it to solidify. Through experimentation you soon will learn when a given sheave has contracted to approximately its final dimension. Then pour the hub. Being relatively small in diameter, the hub will shrink comparatively little and the minimum stress will be set up in the casting. This pouring procedure will eliminate the tendency for the spokes to push into the hub, or through the rim or for the casting to hot tear.

An estimate of the composition of the metal in the castings, based on the cupola mixture, indicates a silicon content of about 1.30 per cent and a carbon content of about 3.25 per cent. This metal should have excellent mechanical properties and should respond well to alloy additions. However, the chilling action of the spokes may have a tendency to produce mottled or white iron at the junction with the hub or the rim. To avoid this, increase the silicon slightly but avoid an excess which will weaken the iron unduly.

Requests Pouring Temperatures

What type of pyrometer should I use in my brass foundry and what pouring temperatures do you suggest for the alloys I pour most often?

Get an immersion pyrometer; an optical pyrometer will not give accurate results with alloys containing zinc because of the fumes. Accessories to overcome these make the optical pyrometer inconvenient for intermittent use.

It is difficult to recommend a specific pouring temperature since there are a number of factors to consider in addition to the melting point of the alloy. Some of these factors are: size of gates, thickness of casting, cope height, pouring rate, distance metal must be carried, number of times metal is transferred, etc. Using as a guide the information which follows, discover the proper pouring temperature for your various classes of castings through a few experiments.

Pour pure copper and the 98 per cent copper-2 per cent zinc alloy at least 150 F above the melting point. Thorough deoxidation will add materially to the fluidity of high copper alloys. For bell metal (Cu 80%, Sn 20%) pour at 1950 to 2000 F. A pouring temperature approximately 2150 F is a good starting point from which to work with the 88-8-4, the 88-9-2-1, and the 85-three 5's alloys.

Plans Continuous Pouring System

We contemplate installing a continuous pouring system and will melt approximately 100 lb per minute for a period of five hours. The present melting rate of our cupola, a 72 in. shell lined down to 54 in., is approximately 200 lb per minute when using a 13 oz blast pressure. We should like the answers to several questions on cupola operation and sand.

If your cupola is lined down to an inside diameter of 32 in. and you operate with a coke ratio of 10 to one, your cupola will melt about 100 lb per minute with 1800 cfm and a wind-box pressure of 14 oz per sq in. There should be no tendency to bridge if the smaller size cupola is properly operated.

Stopping the blast at frequent intervals or for excessive periods of time make for irregular composition and loss in temperature. For shutdowns up to 15 minutes, merely bott the cupola. If you plan to shut down for lunch, add an extra charge of coke in time to reach the bed when the shutdown starts. In either case, *open a tuyere to prevent an explosive mixture of carbon monoxide and air backing into the windbox!*

There is no reason why you should encounter diffi-

culties starting your new foundry unit with all new sand provided the sand does not contain excessive quantities of foreign materials (such as leaves, roots, lime, etc.), and provided its properties as determined by the conventional A.F.S. sand tests meet the requirements of the castings you intend to produce.

How to Break Scrap

The scrap iron situation is so acute that we are considering the installation of our own equipment for breaking large size scrap. What suggestions, specifications, and designs do you recommend?

A heavy ball or "skull cracker" is widely used and lends itself to breaking a great variety of sizes and shapes of scrap. The heavy steel ball, frequently cast of austenitic manganese steel, may be lifted by a crane and electromagnet, or by a winch. In the former case, cutting off the current releases the ball which has been lifted to a height necessary to break the scrap. A winch, used generally by smaller foundries, can be hand or power driven.

A simple installation can be made using a winch and a tripod made of telephone poles. A cable, run through a pulley or sheave suspended from the tripod, has at the ball end, a catch which releases the ball when it reaches the top of the tripod. For this type of equipment the "skull cracker" should be cast with an eye or loop for the catch.

There is some danger from flying pieces of scrap. Therefore, the area used for breaking scrap with dropping-ball type of equipment should be enclosed by a wall of reinforced concrete or heavy timber.

Eliminates Hard Iron Crack

The crack in the enclosed hard iron casting is typical of the defect which has troubled us considerably recently. We have determined that the cracks do not reach to the inner surface of the casting. Although the location varies somewhat, the crack always appears within a two-inch area. A typical analysis of the iron is: C 2.45%, Si 1.10%, Mn 0.38%, S 0.054%, P 0.156%.

The hairline crack appears to be due to the core in this section of the casting not collapsing soon enough. This causes high surface stresses which crack the casting. You can remedy this by using less binder in the core, using a binder which will burn out or soften at the appropriate time, by using wood flour or other cushioning material, or by ramming the core less hard.

Setting Up Hardness Specifications

A handbook we have been using describes soft cast iron as having a Brinell hardness of 127, medium cast iron 177, and hard cast iron 224. If we adopt these specifications what range of hardness should we allow?

Use of the terms "soft, medium, and hard" in describing cast iron should be discouraged. It is much more appropriate to speak in terms of specific hardness numbers inasmuch as cast iron ranges from as low as 100 to as high as 450 Brinell, and higher.

A.F.S. is not a specification body such as ASTM. Use ASTM specifications insofar as possible in setting up specifications for your irons. It is not safe, in any case, to use handbook values and hope the material you produce has the same properties. Test standard specimens to determine actual hardness values and other properties for the iron you are producing.

In specifying the properties of cast iron, the effect of section thickness must be considered. In general, cast iron is harder in the thinner sections and softer in the heavier sections of the same casting.

It is the custom in many foundries to measure Brinell hardness on the broken end of a standard arbitration bar. The measurement is made after grinding a flat spot on the bar, removing enough material to get below the skin of the casting. A simple jig will insure grinding to the same depth on each bar.

Foundrymen often specify a hardness range of plus or minus five points and sometimes use a range of 15 or 20 points. This should not be a matter for judgment alone but should be based on actual hardness tests of irons regularly produced in your foundry.

Scrap Pile Growing Too Large

We are making austenitic manganese steel in a basic electric furnace. As a result of a good deal of prejudice from previous experience, and hearsay, we are limiting the percentage of return scrap in the charge to 10 per cent. As a result, we are building up a large scrap pile of returns and suffering a considerable economic loss.

Some foundries are using as much as 50 per cent austenitic manganese steel scrap in the charge. This scrap consists of about equal parts of purchased scrap and foundry returns. One foundry melting a charge consisting of 4300 lb of manganese steel scrap and 3000 lb of carbon steel plate has a loss of manganese of only three to six per cent. There appears to be no reason for restricting the percentage of manganese steel scrap if your finishing practice insures clean steel and the proper analysis.

Wants Iron for Flame Hardening

Will you recommend an iron for cam rollers and gears which are to be flame hardened to improve wear resistance?

Without more specific information on size and section thickness it is difficult to give anything better than a rather general recommendation. You might try iron of the following range of analysis, varying the silicon and carbon content to suit the section thickness:

	Per Cent
Total Carbon	2.75—3.00
Combined Carbon	0.75—0.90
Silicon	2.20—2.50
Manganese	0.55—0.70
Sulphur	0.10 max.
Phosphorus	0.25 max.
Nickel	1.40—1.60
Chromium	0.35—0.50
Molybdenum	0.40—0.60

This iron is suitable for metal sections ranging from one-half to 3 in. In a conventional arbitration bar the tensile strength will be 50,000 to 60,000 psi, the transverse strength will be 3100 to 3400 lb, and the deflection 0.25 to 0.30 in.

Heat the areas to be flame hardened to 1550 F, quench, and then temper at 350 to 400 F to relieve quenching stresses.

INFLUENCE OF CHROMIUM ON GRAPHITIZATION OF WHITE CAST IRON

Gabriel Joly
Foundry Industry Technical Center
Paris, France

Reporting the results of an investigation of annealing cycles and boron additions necessary to overcome the retarding effect of chromium present in the charge, the Official Exchange Paper of the French Foundry Technical Association to A.F.A., "Influence of Chromium on Graphitization of White Cast Iron," was presented at the 52nd Foundry Congress in Philadelphia, May 3-7, 1948.

Pig iron and steel scrap that malleable founders charge into the melting furnace often contain impurities which affect graphitization of the iron during annealing. The most frequently occurring impurity is chromium. When present in the iron even in small percentages, it precludes formation of a normal microstructure with standard annealing practice.

In the present study the author proposes to determine the annealing cycles necessary to obtain, with each chromium content accidentally occurring, an iron having ferritic-nodular graphitic structure.

Chromium Content of Iron Studied

The base pig iron that the author used had been refined in a reverberatory furnace heated by pulverized coal. Its chemical composition was as follows: C–2.16, Si–1.50, Mn–0.43, S–0.09, P–0.13 and Cr–0.03 per cent.

This iron was remelted in a coke-fired crucible furnace. Ten consecutive heats were made, and they are divided into two groups:

1. Five heats with chromium additions, and
2. Five heats with chromium additions to which 0.002 per cent boron was added to the melt in the form of 17-18 per cent ferro-boron.

Table 1 gives the chromium content of the ten heats made. Chromium was not intentionally added to Heats 1 and 6b. Heats 6b, 7b, 8b, 9b and 10b contain boron. The exact boron content has not been determined. It is about 0.002 per cent.

These ten heats permit not only determination of annealing cycles when the metal contains small percentages of chromium, but also determination of the influence of 0.002 per cent boron in the presence of chromium. The 0.002 per cent boron addition has been used because it corresponds to the amount usually added in foundry operations.[1]

Table 1—Chromium Content of Ten Heats Poured

Heat No.	Cr Content, per cent
1	0.032
2	0.082
3	0.099
4	0.125
5	0.130
6b	0.035
7b	0.056
8b	0.086
9b	0.124
10b	0.137

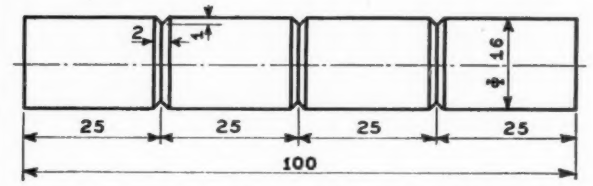


Fig. 1—Diagrammatic sketch showing dimensions of test bars for annealing tests, in mm.

Dimensions of Test Bars

Cylindrical test bars, 16 mm in diameter and 100 mm in length (Fig. 1) were poured. Each bar had three notches which permit breaking into four small bars 25 mm in length. Each mold contained 20 cylindrical test bars. Two molds were poured from each of the ten heats of metal.

Chemical analysis and heat treatment tests were made on test bars from the same heat and from the same mold. Seven adjacent test bars from one mold yield 28 small bars of 25 mm in length for test purposes. Twenty-three bars have been used to develop the annealing cycles and five bars for chemical analysis. This arrangement assures homogeneity of chemical composition of different bars in each heat. This homogeneity has been verified by spectrographic analysis.

Annealing Cycles Adopted

Most annealing furnaces used in France are heated with pulverized coal or coke. The test pieces were placed in annealing pots stacked four or five high in the furnace. The interspaces between the castings are filled

with used firebrick, sand and other refractory material which does not adhere to the castings at the annealing temperature and which protects the castings from oxidation by combustion gas and prevents their deformation or warpage.

This procedure gives the furnace a great thermal inertia. The period of rising temperature for annealing is, consequently, quite extended, as is the duration of cooling between the two stages of graphitization.

As the author hoped that results of the present study could be put to practical use by foundries, he has tried to simulate as much as possible industrial operating conditions. He has therefore adopted the time of temperature rise (Fig. 2) to the annealing temperature and the descent between the two stages of graphitization equal respectively to 24 hr and 12 hr.

The annealing was carried out in an electric furnace. The temperature of the first stage of graphitization was 920 C ± 10 (1690 F). The temperature of the second stage of graphitization was 740 C ± 7 (1360 F).

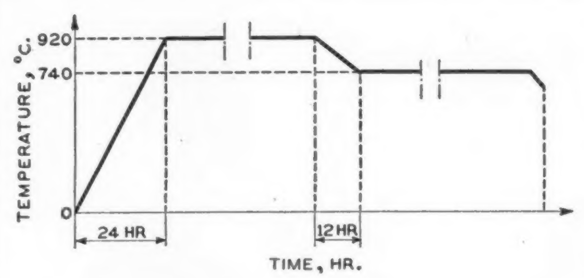


Fig. 2—Diagram of annealing cycle.

TABLE 2—HEATING TIME OF TEST BARS AT 920 C

Order of Removal from Furnace Test Bar Identity	Time at 920 C, Hr
A	2½
B	3⅙
C	4
D	5
E	6⅓
F	8
G	10
H	12½
I	16
J	20
K	25
L	31½

TABLE 3—HEATING TIME OF TEST BARS AT 740 C

Order of Removal from Furnace Test Bar Identity	Time at 740 C, Hr
M	10
N	12½
O	16
P	20
Q	25
R	31½
S	40
T	50
U	63
V	80
W	100

TABLE 4—TIME NECESSARY FOR DECOMPOSITION OF CARBIDES

Heat No.	Cr Content, per cent	First Test Bars Free From Cementite	Time for Decomposition of Carbides, Hr
1	0.032	1E	5 to 6⅓
2	0.082	2H	10 to 12½
3	0.099	3J	16 to 20
4	0.125	4J	16 to 20
5	0.130	5K	20 to 25
6b	0.035	6bF	6⅓ to 8
7b	0.056	7bG	8 to 10
8b	0.086	8bH	10 to 12½
9b	0.124	9bJ	16 to 20
10b	0.137	10bK	20 to 25

TABLE 5—TIME NECESSARY FOR DECOMPOSITION OF PEARLITE

Heat No.	Cr Content, per cent	First Test Bars Free From Pearlite	Time for Decomposition of Pearlite, Hr
1	0.032	1M	Less than 10
2	0.082	2U	50 to 63
3	0.099	3V	63 to 80
4	0.125	4W	80 to 100
5	0.130	5W	More than 100
6b	0.035	6bM	Less than 10
7b	0.056	7bN	10 to 12½
8b	0.086	8bQ	20 to 25
9b	0.124	9bT	40 to 50
10b	0.137	10bW	80 to 100

The test bars (16 mm in diameter and 25 mm in length) were packed in extra siliceous white sand in iron tubes 40 mm in diameter and 400 mm in length. The tubes were carefully luted at each end with refractory clay to avoid air seepage. Each tube contained a test bar from each of the ten heats studied.

A baffle constructed of refractory bricks had been placed at each side of the annealing furnace and the packed tubes were placed on the hearth in the center of the furnace. Thus temperature differences which would be present in the immediate vicinity of heating elements were avoided.

Time Cycle of Two Stages of Graphitization

Time intervals for each of the two temperatures of graphitization have been arranged according to a sensitive exponential law. Therefore, after the temperature of 920 C had been reached, the first 12 tubes were removed successively from the furnace at the end of the time intervals shown in Table 2.

After holding the furnace temperature for 31½ hr at 920 C (1690 F) it was dropped to 740 C (1360 F) in 12 hr. After this temperature had been reached the last 11 tubes were removed from the furnace at time intervals shown in Table 3.

As the test bars were removed from the furnace their microstructure was studied to determine the decomposition time of cementite and of pearlite. The influence of chromium and boron on the dimensions of graphite nodules was also studied.

Table 4 indicates time necessary for decomposition of the carbides. Table 5 indicates time necessary for decomposition of the pearlite. Table 6 indicates diameter of graphite nodules and the mean number of

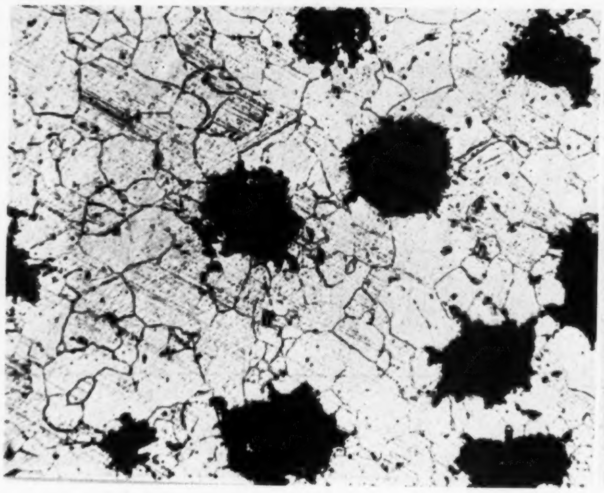


Fig. 3—Test bar 1M (Cr—0.03%).

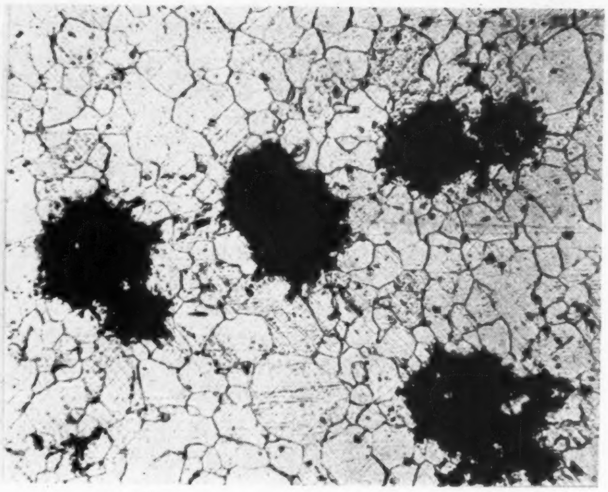


Fig. 4—Test bar 2U (Cr—0.08%).

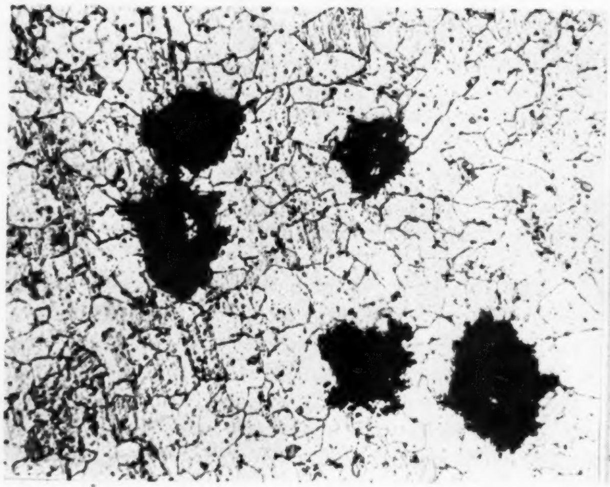


Fig. 5—Test bar 3V (Cr—0.09%).

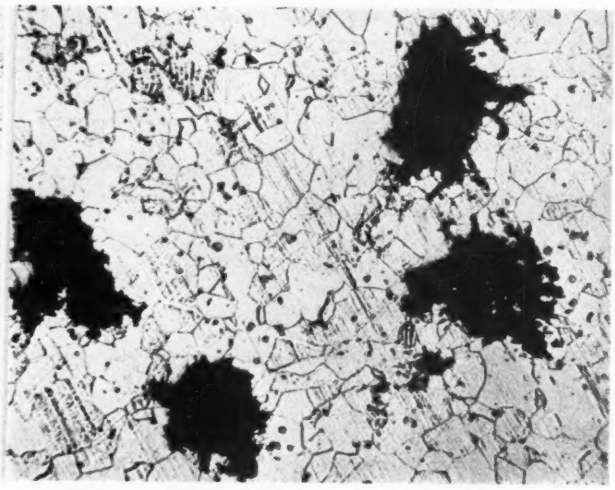


Fig. 6—Test bar 4W (Cr—0.12%).

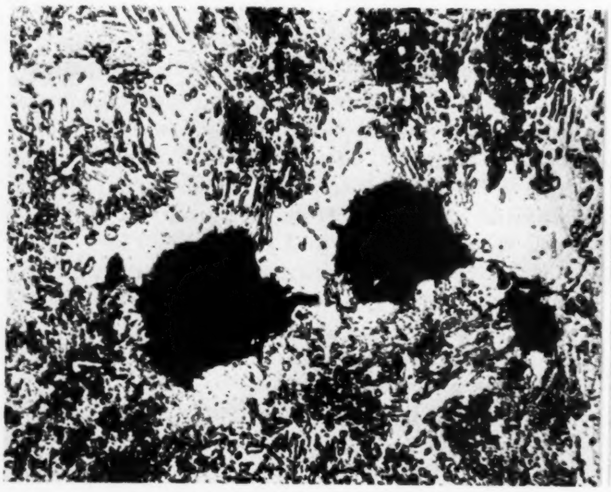


Fig. 7—Test bar 5W (Cr—0.13%).

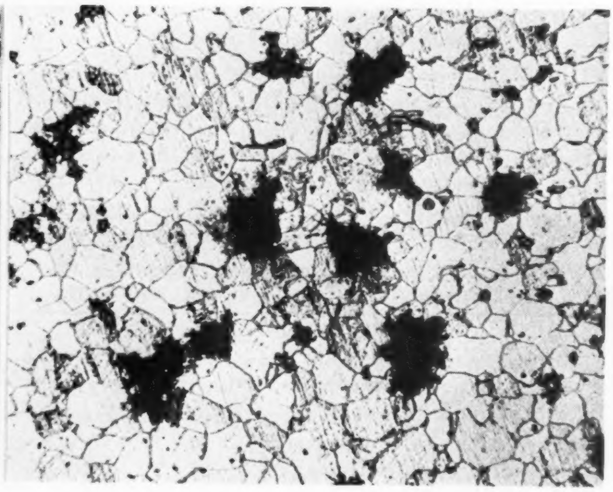


Fig. 8—Test bar 6bM (Cr—0.03%).

Microstructure of test bars. Mag. 150×.

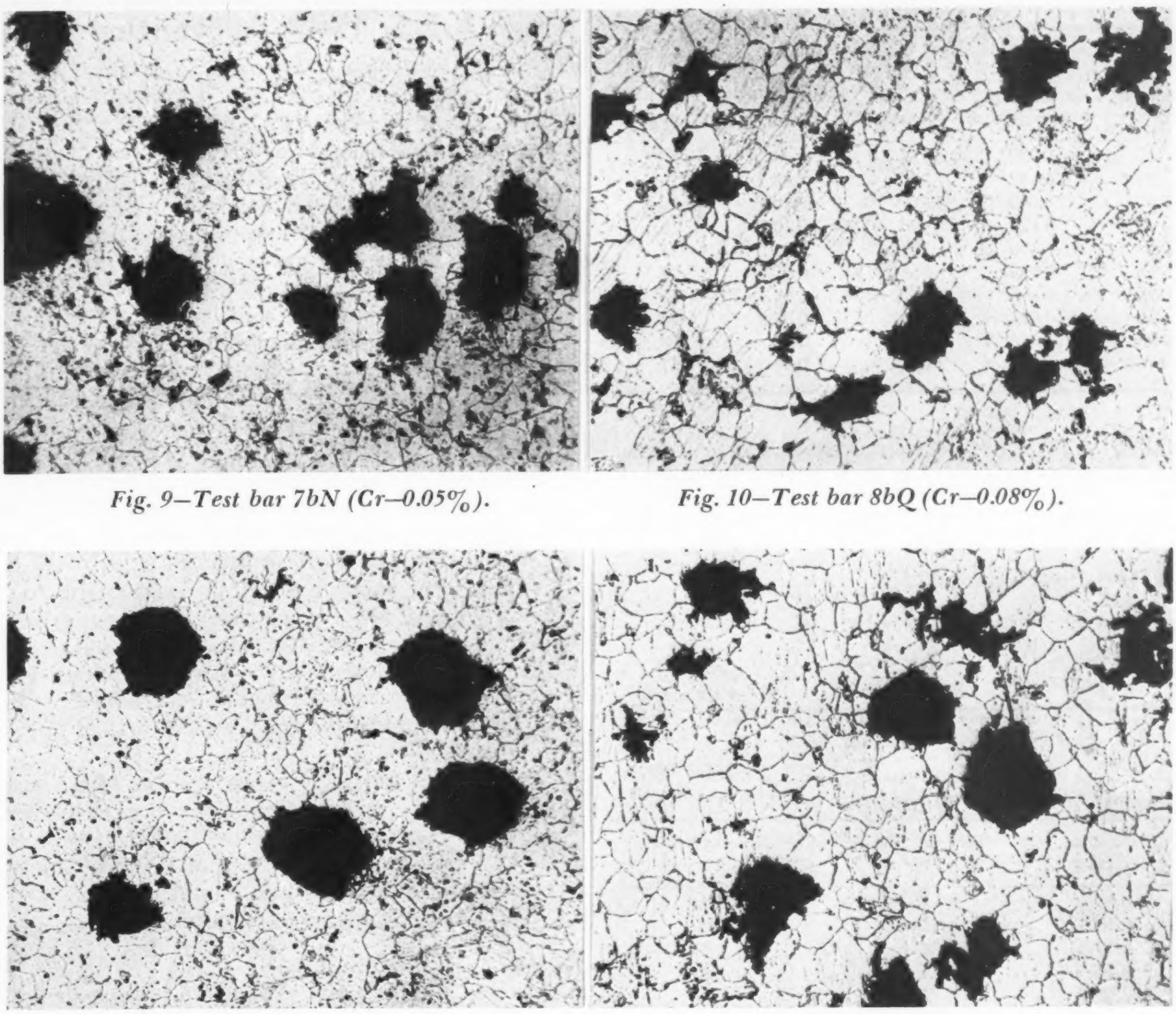


Fig. 9—Test bar 7bN (Cr—0.05%). *Fig. 10—Test bar 8bQ (Cr—0.08%).*

Fig. 11—Test bar 9bT (Cr—0.12%). *Fig. 12—Test bar 10bW (Cr—0.13%).*

Microstructure of test bars. Mag. 150×.

nodules per sq mm. The photomicrographs at 150 X (Figs. 3 to 12) show the microstructure of the test bars.

Conclusions

From examination of the results herein presented the author draws the following conclusions:

1. *Influence of chromium on the two stages of graphitization of malleable black-heart iron.* Chromium retards the rate of decomposition of cementite during the first stage of graphitization as well as the rate of decomposition of pearlite. Its retarding action is not as effective in the first stage of graphitization as in the second stage.

Many French foundries experience significant temperature differences between the extreme points in their furnaces, which lead them to adopt long periods at temperature for the first stage of graphitization. The time is at least 40 hr. The presence of chromium is not therefore a hindrance inasmuch as decomposition of cementite is concerned. On the contrary, the duration at temperature in the second stage of graphitization is, in general, short. In most cases it is less than 60 hr. When the chromium content reaches 0.06 to 0.07 per cent the test pieces contain pearlite. To overcome this inconvenience it would be necessary to prolong annealing to 100-hr or even 120-hr duration in the second stage of graphitization to obtain a normal structure even when the chromium content reaches 0.12 per cent.

2. *Action of boron in presence of chromium on duration of both stages of graphitization.* Boron in percentages less than 0.002 per cent added to the molten metal before pouring does not influence the rate of decomposition of carbides in the first stage of graphitization. On the other hand it reduces considerably the time necessary to effect decomposition of pearlite.

The diameter of the nodules of graphite is reduced at the same time their number is increased.

3. *Annealing cycles to adopt when metal contains chromium.* When boron has not been added to the melt prior to pouring it is necessary to anneal as shown in Table 7 to overcome the undesirable influence of chromium.

When 0.002 per cent boron has been added to the melt at the time of pouring, the figures of Table 7

TABLE 6—DIAMETER OF NODULES AND NUMBER OF NODULES PER SQ MM

Heat No.	Cr Content, per cent	Test Bar Identity	Mean Dia. of Graphite Nodules in mm	No. of Nodules per sq mm
1	0.032	1M	0.08	26
2	0.082	2U	0.13	16
3	0.099	3V	0.10	20
4	0.125	4W	0.10	16
5	0.130	5W	0.15	11
6b	0.035	6bM	0.05	29
7b	0.056	7bN	0.06	29
8b	0.086	8bQ	0.07	29
9b	0.124	9bT	0.06	28
10b	0.137	10bW	0.06	37

TABLE 7—TIME OF GRAPHITIZATION DURING BOTH STAGES OF ANNEALING FOR IRON WITHOUT BORON

Cr Content, per cent	Time at 920 C, Hr	Time at 740 C, Hr
0.03	7	10
0.06	12½	45
0.08	16	65
0.10	20	80
0.12	25	100
0.14	30	More than 100

TABLE 8—TIME OF GRAPHITIZATION DURING BOTH STAGES OF ANNEALING FOR IRON WITH 0.002% BORON

Cr Content, per cent	Time at 920 C, Hr	Time at 740 C, Hr
0.03	7	10
0.06	12½	15
0.08	16	30
0.10	20	40
0.12	25	50
0.14	30	100

can be modified to conform to those shown in Table 8.

These annealing cycles hold only for the foundry that the author studied and for the temperatures that he has chosen for the two stages of graphitization. They are not applicable if one modifies the factors that affect rate of malleabilization, some of which are noted in the following:

a. Silicon content of white cast iron,
b. Annealing temperature,
c. Manganese content in relation to sulphur,
d. Carbon content,
e. Furnace atmosphere,
f. Degree of superheating of metal before pouring,
g. Rate of cooling after pouring,
h. Source of the pig iron.

The preceding results can be useful to foundries melting and refining a different metal. They should, when their first composition contains chromium, guard against its retarding action by the addition of boron at the time of pouring and in prolonging sufficiently the second stage of graphitization.

Reference

[1] N. F. Tisdale, "Boron in Malleable Iron," *The Foundry*, pp. 107, 222, April (1945).

Blueprints and Drawings Needed For A.F.S. 1949 Apprentice Contest

PLANNING EARLY FALL OPENING of the 1949 A.F.S. Apprentice Contest, the Contest Committee is starting now to secure blueprints and drawings from which contest projects can be selected. Anyone having extra patterns or blue prints of cast parts which meet the requirements outlined below is invited to submit them for consideration by the Apprentice Contest Committee. Blueprints or drawings may represent castings that are now in use or are obsolete. Company designations and part numbers will be deleted.

Castings for the three molding divisions of the contest—gray iron, steel, nonferrous—should be small enough to pour from a single hand ladle. An uneven parting line is essential and the casting should be capable of being molded in several ways. The casting must require the apprentice to display knowledge of the principles of controlled directional solidification.

Apprentices should be able to complete the pattern for that division of the contest in eight to 16 hours. The project must require the contestant to show knowledge of the basic principles of patternmaking and the ability to handle tools. In addition to offering several alternate methods of pattern construction, the pattern should require the apprentice to show familiarity with foundry processes and principles of castings production.

Drawings and blueprints meeting these requirements may be sent to Apprentice Contest Committee Chairman Roy W. Schroeder, Foundry Department, Navy Pier Branch, University of Illinois, Chicago, or to P. D. Johnson, American Foundrymen's Society, 222 West Adams St., Chicago 6, Illinois.

Urge Iron and Steel Manufacturers To Investigate New York Ore Lodes

THE DISCOVERY AND EXPLORATION of what may be substantial deposits of iron ore in the Adirondack Mountains near Santa Clara in Franklin County, N.Y., has led the New York State Department of Commerce to urge 23 of the nation's leading iron and steel manufacturing and mining firms to investigate their possibilities for commercial exploitation.

Carl E. Guthe, director of the New York State Science Service, reports that discovery of two deposits was made two years ago, and that since that time modern scientific equipment has been employed to prepare detailed maps of the area.

A ton of iron from New York's Adirondacks costs as much as a ton of iron from Minnesota's Mesabi range at Pittsburgh, according to Harold Keller, commissioner of the State Department of Commerce, but, he added, the New York iron is of much higher quality.

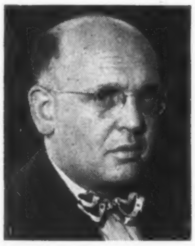
Once an important source of iron during Colonial days, New York State's production has dropped off during the past hundred years. Today, New York's half-billion-tons of unmined iron ore is regarded as a secondary reserve.

Mining operations in New York State, Mr. Keller states, have the advantage of year-round transportation as compared with eight months water transportation from Mesabi.

WHO'S WHO

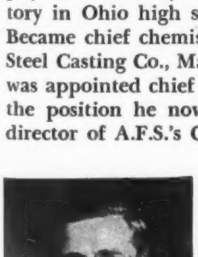
Gabriel Joly

Gabriel Joly, author of *"Influence of Chromium on White Cast Iron,"* Page 60, exchange paper of l'Association Technique de Fonderie Francaise, is chief cast iron metallurgist for France's Technical Center of Foundry Industries . . . Holds degrees from the Faculte des Sciences de Lille, the Institut Industriel du Nord, and the Ecole Superieure de Soudure Autogene de Paris . . . Upon completion of his studies, Mr. Joly became a metallurgist with Stacoffe, Gauliard & Co., Friville-Escarbotin, France, and in 1939 left there to become technical director of the Tanvez Mfg. Co., Guingamp, France . . . In 1942, he joined the Technical Center of Foundry Industries as an engineer and was appointed chief of the cast iron metallurgy department in 1945.



Robert A. Willey

Robert A. Willey, co-author of *"Develop Chemical Method for Faster Sand Analysis,"* Page 50, has authored several papers in metals industry publications and has addressed many national meetings of engineering and technical societies on the subject of steel founding . . . After graduation from Ohio Wesleyan University in 1928, he taught physics, chemistry, mathematics and history in Ohio high schools until 1942 . . . Became chief chemist for the Commercial Steel Casting Co., Marion, O., in 1942, and was appointed chief metallurgist in 1944—the position he now holds . . . He is a director of A.F.S.'s Central Ohio Chapter.



John B. Caine

John B. Caine, co-author with R. A. Willey of *"Develop Chemical Method for Faster Sand Analysis,"* is well known to A.F.S. members for his many appearances before Society meetings and for his frequent contributions to the technical press . . . Attended the University of Cincinnati and the Case Institute of Technology . . . After graduation he served a two-year apprenticeship at Interstate Foundries, Cleveland . . . In 1925, he was appointed metallurgist for Mathews Steel Casting Co., and in 1932 took over similar duties with the Sawbrook Steel Casting Co., Cleveland . . . Mr. Caine is past chairman of the Cincinnati Chapter and has served on various National A.F.S. committees . . . He was awarded the Technical and Operating Medal of the SFSA in 1945 and is a member of the ASM and the British Iron & Steel Institute.

Ralph L. Lee

Ralph L. Lee, author of *"Develop Foundry Cost System,"* Page 34, heads A.F.S.'s Foundry Costs Committee, and is secretary-treasurer of Milwaukee's Grede Foundries, Inc. . . . Born in Macon County, Ill., he attended Milliken University, St. Louis, as a law student and, later, Walton School of Commerce, Chicago . . . Upon graduation he joined Mueller Co., Decatur, Ill., as purchasing agent . . . Later served, successively as purchasing agent, McDonald, Cook & Buck Co., Detroit; office manager at Wagner Malleable Iron Co., Decatur, and as secretary-treasurer, Liberty Foundry Co., Milwaukee . . . When that company merged with others to form Grede Foundries, Inc., Mr. Lee was appointed comptroller . . . In addition to heading the A.F.S. Foundry Cost Committee, he has served on the Cost Committee of the Gray Iron Founder's Society for many years.

CHAPTER MEETINGS

JULY 16
WISCONSIN
Ozaukee Country Club
FOUNDRY OUTING AND STAG

JULY 26
TWIN CITY
Midland Hills Country Club, St. Paul
GOLF TOURNAMENT AND DINNER

AUGUST 14
CHICAGO
Acacia Country Club
19TH ANNUAL GOLF PARTY

SOUTHERN CALIFORNIA
Lakewood Country Club, Long Beach
CHAPTER PICNIC

Repeating a program presented before a number of A.F.S. chapters, S. W. Healy (left) and S. D. Martin of Central Foundry Division, General Motors Corp., illustrated their talk at the May 24 meeting of the Central Ohio Chapter with actual demonstrations of fatigue-free, efficient coremaking.

CHAPTER ELECTIONS

Birmingham District Chapter

Chairman—Dr. J. T. MacKenzie, Tech. Dir., American Cast Iron Pipe Co.
Vice-Chairman—C. P. Caldwell, Pres., Caldwell Foundry & Machine Co.
Secretary-Treasurer—Fred K. Brown, Sales Mgr., Adams, Rowe & Norman, Inc.
Directors—Terms Expire 1949
Joseph T. Gilbert, Asst. to V.P., Stockham Pipe Fittings Co.
W. E. Jones, Chf. Engr., Stockham Pipe Fittings Co.
Fred S. Middleton, Jr., V.P., Production Foundries Div., Jackson Industries, Inc.
J. A. Woody, Gen. Supt., American Cast Iron Pipe Co.
Directors—Terms Expire 1950
Donald A. Abbott, Serv. Eng., Hill & Griffith Co.
D. C. McMahon, Slsmn., Harbison-Walker Refractories Co.
J. Paul Singleton, Wks. Mgr., Central Foundry Co., Holt.
Directors—Terms Expire 1951
J. A. Bowers, Melting Supt., American Cast Iron Pipe Co.
Clyde E. Hagler, V.P., Continental Gin Co.
B. W. Worthington, Dev. Engr., McWane Cast Iron Pipe Co.

Canton District Chapter

Chairman—Edw. H. Taylor, Plant Engr., F. E. Myers & Bros. Co., Ashland.
Vice-Chairman—Geo. M. Biggert, Met. Res. Dept., United Engineering & Foundry Co, Canton.
Secretary—Robt. L. Fasig, Asst. Works Mgr., Ashland Malleable Iron Co., Ashland.
Treasurer—Otis Clay, Owner, Tuscora Foundry Sand Co., Canal Fulton.
Directors—Terms Expire 1949
Thos. W. Harvey, Chief Engr., The Pitcairn Co., Pittsburgh Valve & Fitting Div., Barberton.
C. E. Shaw, Wks. Engr., American Steel Fdries., Alliance.
Directors—Terms Expire 1950
J. W. Fairburn, Ashland Malleable Iron Co., Ashland.
Nils E. Moore, Wadsworth Testing Laboratories, Canton.
H. G. Stevener, American Steel Foundries, Alliance.
Directors—Terms Expire 1951
F. K. Donaldson, Vice Pres., Machined Steel Casting Co., Alliance.
Robert Cairnie, Owner, The Orville Bronze & Alum. Co., Orville.
Charles Reyman, Jr., Fdry. Supt., Atlantic Foundry Co., Akron.

Central Illinois Chapter

Chairman—F. W. Shipley, Fdry. Mgr., Caterpillar Tractor Co., Peoria.
Vice-Chairman—Chas W. Bucklar, Jr., Supt., Superior Foundry Co., East Peoria.
Secretary-Treasurer—Vern W. Swango, Frm., Caterpillar Tractor Co., Creve Coeur.
Directors—Terms Expire 1949
A. V. Martens, Pres., Pekin Foundry & Mfg. Co., Pekin.
L. E. Roby, V.P., Peoria Malleable Castings Co., Peoria.
F. W. Shipley, Caterpillar Tractor Co., Peoria
Directors—Terms Expire 1950
Zigmond Madacey, Fdry Supt., Caterpillar Tractor Co., Pekin.
John M. McCarthy, Jr., V.P., South Side Foundry, Peoria.
Directors—Terms Expire 1951
E. J. Burns, Pres., Illini Foundry Co., Peoria.
C. B. Soper, Treas., American Fdry. & Furnace Co, Bloomington, Illinois.

Chesapeake Chapter

Chairman—Blake M. Loring, Head Non.Fer.Sec., U.S. Naval Research Lab., Washington, D.C.
Vice-Chairman—J. B. Mentzer, Sec'y.-Treas., Wood-Embly Brass Co., Waynesboro, Pa.
Secretary-Treasurer—Clausen A. Robeck, V.P., & Supt., Gibson & Kirk Co., Annapolis, Md.
Technical Secretary—Wm. H. Baer, Assoc. Met., Naval Research Laboratory, Washington, D.C.
Directors—Terms Expire 1949
A. A. Hochrein, Dist. Mgr., Federated Metals Div., American Smelting & Refining Co., Baltimore, Md.
James J. Lacy, V.P., James J. Lacy Co., Baltimore, Md.
Directors—Terms Expire 1950
L. Earl Gaffney, V.P., Arlington Bronze & Alum. Corp., Baltimore, Md.
David Tamor, Plant Met., American Chain & Cable Co., York, Pa.
Directors—Terms Expire 1951
L. H. Denton, Baltimore Convention Bureau, Baltimore, Md.
Frank B. Gately, Ass't. Sec'y., Flynn & Emrich Co., Baltimore, Md.
Wm. H. Holtz, American Brake Shoe Co., Baltimore, Md.

Chicago Chapter

Chairman—C. K. Faunt, Wks. Mgr., Christensen & Olsen Foundry Co.
Vice-Chairman—W. D. McMillan, Met., International Harvester Co.
Secretary—Victor M. Rowell, Tech. Sls. Repr., Velsicol Corp.
Directors—Terms Expire 1949
J. C. Gore, Chicago Mgr., Werner G. Smith Co.
D. H. Lucas, Mfrs. Representative.
H. K. Swanson, Owner, Swanson Pattern & Model Works, East Chicago, Ind.
Chester V. Nass, Mgr. Fdry. Div., Pettibone-Mulliken Corp.
Directors—Terms Expire 1950
G. W. Anselman, Serv. Engr., Goebig Mineral Supply Co., Elgin.
W. B. George, Fdry. Engr., R. Lavin & Sons, Inc.
Robert M. Jones, Carnegie-Illinois Steel Corp.
Laurence H. Hahn, Met., Sivyer Steel Casting Co.
Directors—Terms Expire 1951
Roy Frazier, Fdry. Consultant, Love Bros., Inc., Aurora.
Alfred W. Gregg, Exec. Engr., Whiting Corp. Harvey.
Martin Rintz, Fdry. Supt., Continental Foundry & Machine Co.
Fred B. Skeates, Fdry. Supt., Link Belt Co.

Cincinnati District Chapter

Chairman—Alexander D. Barczak, V.P., Bardes Forge & Foundry Co.
Vice-Chairman—Austen J. Smith, Met., Lunkenheimer Company.
Secretary—B. A. Genthe, Mgr., S. Obermayer Company.
Treasurer—Chas. S. Dold, Asst. Mgr. Coke Sales, Portsmouth Steel Corp.
Assistant Treasurer—Walter A. Funck, Gen. Supt., The Reliance Foundry Co.
Directors—Terms Expire 1949
Geo. A. Avril, G. A. Avril Smelting Works.
Chas. S. Dold.
C. H. Fredricks, Cincinnati Milling Machine Co.
Walter A. Funck.
Earl F. Kindinger, Fdry. Engr., Williams & Co., Inc.
Paul Ziegler, G.M., H. P. Deuscher Co., Hamilton.
Directors—Terms Expire 1950
Alexander D. Barczak.
B. A. Genthe.
Arthur L. Grim, Supt. of Fdry., The Dayton Malleable Iron Co., Dayton.
J. D. Judge, Works Engr., Hamilton Foundry & Machine Co., Hamilton.
Walter J. Klayer, Aluminium Industries, Inc.
Alfred W. Schneble, Jr., Plt. Mgr., Advance Foundry Co. Dayton.
Austen J. Smith.

Directors—Terms Expire 1951
R. E. Ashburn, Supt., Sawbrook Steel Castings Company.
Geo. A. Euskirchen, Pres., Cincinnati Foundry Company.
J. H. Pearson, Chf. Ind. Eng., Williamson Heater Company.
A. W. Schlegel, Mgr., Ideal Pattern Works, St. Bernard.
Russell S. Whitehead, Field Engr., Electro Refractories and Alloys Corp.

Eastern New York Chapter

Chairman—Alexander C. Andrew, Fdry. Frm., American Locomotive Co., 119 Edwards St., Schenectady, N.Y.
Vice-Chairman—Kenneth F. Echard, Met., Eddy Valve Company, Waterford.
Secretary-Treasurer—Ugo Navarette, Frm., General Electric Co., Schenectady.
Directors—Terms Expire 1949
Scott Mackay, Rensselaer Polytechnic Institute, Troy.
Theodore O. Carlson, Fdry. Frm., General Electric Co., Elnora.
Kenneth Mason, Fdry. Engr., Albany Castings Co., Albany.
Directors—Terms Expire 1950
Leonard Nelson, Supt., Ludlow Valve Co., Troy.
Leo Scully, Mgr., Scully Foundry & Machine Co., Coxsackie.
Jasper N. Wheeler, Pres., Wheeler Brothers Brass Foundry, Troy.
Directors—Terms Expire 1951
Reginald DeVarennes, Plant Mgr., Rensselaer Valve Co., Troy.
Roy Garrison, V.P., Adirondack Foundries & Steel Co., Watervliet.
Paul Wilson, Supt., James Hunter Machine Co., North Adams.

Michiana District

Chairman—K. A. Nelson, Branch Mgr., Chicago Hardware Foundry Co., Elkhart, Ind.
Vice-Chairman—John Rush, Supt., Elkhart Brass Mfg. Co., Elkhart, Ind.
Secretary-Treasurer—V. S. Spears, Sales Engr., American Wheelabrator & Equip. Corp., Mishawaka, Ind.
Directors—Terms Expire 1949
Wm. Ferrell, Gen. Wks. Supt., Auto Specialties Mfg. Co., St. Joseph, Mich.
George Garvey, Patt. Frm., City Pattern & Foundry Co., Inc., South Bend, Ind.
Stanley F. Krzeszewski, Factory Mgr., American Wheelabrator & Equip. Corp., Mishawaka, Ind.
Howard B. Voorhees, Fdry. Supt., Peru Foundry, Peru, Ind.
Directors—Terms Expire 1950
A. J. Edgar, Wks. Mgr., Benton Harbor Malleable Industries, Inc., Benton Harbor, Mich.
W. J. Freyer, Weil-McLain Co., Michigan City, Ind.
Wm. F. Lange, Jr., V.P., Casting Service Corp., LaPorte, Ind.
Directors—Terms Expire 1950
F. T. McGuire, Met., Sibley Machine & Fdry. Corp., South Bend, Ind.
Directors—Terms Expire 1951
Noel E. Baker, Sales Mgr., Star Pattern & Mfg. Co., Benton Harbor, Mich.
J. Paul Jordan, Fdry. Engr., Dodge Mfg. Corp., Mishawaka, Ind.
Andrew Peterson, Mall. Frm., Oliver Farm Equipment, South Bend, Ind.
E. S. Wegenke, Labor Supt., Sibley Machine & Foundry Corp., South Bend, Ind.

Northeastern Ohio Chapter

President—E. C. Zirzow, Core Rm. Frm., National Malleable & Steel Castings Co., Cleveland.
Vice-President—Walter E. Sicha, Met., Aluminum Co. of America, Cleveland.
Secretary—R. E. Walter, Chem., Werner G. Smith Co., Cleveland.
Treasurer—F. Ray Fleig, Pres., Smith Facing & Supply Co., Cleveland.
Directors—Terms Expire 1949
F. L. Barton, Fulton Foundry & Machine Co., Cleveland.
William G. Gude, Managing Editor, Penton Publishing Co., Cleveland.
Fred J. Pfarr, Plant Mgr., Lake City Malleable Co., Chagrin Falls.
Vincent J. Sedlon, Owner, Master Pattern Co., Cleveland.
C. S. Winter, Pres., Duplex Mfg. and Foundry Co., Elyria.
Directors—Terms Expire 1950
Gerald M. Cover, Prof. of Met. Engrg., Case Institute of Technology, Cleveland.
E. G. Fahlman, Pres., The Permold Co., Medina.
Gilbert J. Nock, V.P., Nock Fire Brick Co., Cleveland.
John Schneider, Industrial Sls. Dept., Cleveland Electric Illuminating Co.
John M. Urban, Fdry. Supt., Fanner Mfg. Co., Cleveland.
Directors—Terms Expire 1951
Lewis T. Crosby, Dist. Mgr., Sterling Wheelbarrow Co., Cleveland.
Lloyd W. Leesburg, Supv., Superior Foundry, Inc., Cleveland.
Henry C. LeBeau, Met., Ohio Injector Co. Wadsworth.
Maurice F. Degley, Engr., Ferro Machine & Foundry Co., Cleveland.
John A. Sharrits, Westinghouse Electric Co., Cleveland.

Northern California Chapter

President—George McDonald, Prod. Mgr., H. C. Macaulay Foundry Co., Berkeley.
Vice-President—J. L. Francis, Vulcan Steel Foundry, Oakland.
Secretary—Charles R. Marshall, Dist. Mgr., Chamberlain Co., Oakland.
Treasurer—Fred Mainzer, Mgr., Pacific Brass Fdry. of San Francisco, San Francisco.
Directors—Terms Expire 1949
William Butts, Gen. Mgr., General Metals Corp.
H. Milton Nystrom, Sales Mgr., Vulcan Steel Foundry Co., Oakland.
John R. Russo, V.P., General Foundry Service Corp., Oakland.
Roy C. Wendelbo, Management Supt., De Sanno Foundry & Machine Co., Oakland.
Directors—Terms Expire 1950
John Bermingham, E. F. Houghton & Co., La Fayette.
Eldo Finley, Supt., San Francisco Iron Foundry, San Francisco.
Philip C. Rodger, Frm., General Metals Corp., Oakland.
William F. U'Ren, Slsmn., Columbia Steel Co., San Francisco.

Ontario Chapter

Chairman—R. A. Woods, Mgr., Geo. F. Pettinos, (Canada), Hamilton, Ont.
Vice-Chairman—J. H. King, Slsmn., Werner G. Smith Co., Ltd., Toronto, Ont.
Secretary-Treasurer—G. L. White, Adv. Mgr., Westman Publications, Ltd., Toronto, Ont.
Directors—To Serve Three Years
Jack Richardson, United Smelting & Refining Co., Hamilton, Ont.
A. C. Boak, Supt. of Fdries., Non-Ferrous Casting Co., Toronto.
A. Reyburn, Supt. of Fdries., Massey-Harris Co., Ltd., Brantford, Ont.
Immediate Past Chairman to serve on Board for one year:
J. Dalby, Mgr., Wilson Brass & Aluminum Foundry, Toronto, Ont.
Directors—Two Year Terms
Neil Kennedy, William H. Kennedy & Sons, Ltd., Owen Sound, Ont.
R. T. Wilson, Asst. Plant Supt., Ontario Malleable Iron Co., Ltd., Oshawa, Ont.
R. H. Williams, Supt. of Fdries., Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Directors—One Year Terms
M. N. Tallman, A. H. Tallman Bronze Co., Ltd., Hamilton, Ont.
C. O. Flowers, Supt., Canada Iron Foundries, Ltd., Hamilton, Ont.
A. E. Bock, Standard Castings, Galt, Ont.

Quad City Chapter

Chairman—M. H. Liedtke, Fdry. Supt., Farmall Works, International Harvester Co., Moline, Ill.
Vice-Chairman—E. P. Closen, Gen. Fdry. Frm., John Deere Planter Works, Moline, Ill.

(Continued on next page)

Secretary-Treasurer—C. R. Marthens, Owner, Marthens Co., Moline, Ill.

Directors—Terms Expire 1949

A. D. Matheson, Works Mgr., French & Hecht, Davenport, Iowa.

A. H. Putnam, Owner, A. H. Putnam Company, 1319 2nd Ave., Rock Island, Ill.

R. H. Swartz, Gen. Mgr., Riverside Foundry, S. & W. Foundry Corp., Bettendorf, Iowa.

Directors—Terms Expire 1950

Wm. C. Bell, Prod. Engr., Frank Foundries Corp., 1517 - 35th St., Rock Island, Ill.

H. L. Mead, Gen. Fdry. Frm., John Deere Harvester Works, East Moline, Ill.

H. A. Rasmussen, Pres., General Pattern Corp., Moline, Ill.

Directors—Terms Expire 1951

C. S. Humphrey, Pres., C. S. Humphrey Company, Moline, Ill.

J. O. Nelson, Supt., Mississippi Foundry Corporation, Rock Island, Ill.

R. E. Wilke, Met., Deere & Company, Moline, Ill

Director—Term Expires 1949

C. L. Briceland, Materials Supply Supv., J. I. Case Company, Bettendorf, Iowa.

Saginaw Valley Chapter

Chairman—Oscar E. Sundstedt, V. P. & G.M., General Foundry & Mfg. Co., Flint.

Vice-Chairman—L. L. Clark, Plant Met., Buick Motor Div., Flint.

Secretary-Treasurer—Raymond H. Klawuhn, Acc't., General Foundry & Mfg. Co., Flint.

Directors—Terms Expire 1949

D. D. Bowman, Office Mgr., Almont Mfg. Co., Almont.

Robert Calkins, V.P., Clio Foundry Co., Clio.

L. A. Cline, Sec'y., Saginaw Foundries Co., Saginaw.

Directors—Terms Expire 1950

M. C. Godwin, Asst. Supt., Bostick Fdry. Co., Lapeer.

C. A. Tobias, Head Science Dept., General Motors Institute.

Howard H. Wilder, Chf. Met., Eaton Mfg. Co., Vassar.

Directors—Terms Expire 1951

Albert E. Edwards, Gen. Frm., Chevrolet Grey Iron Fdry., Saginaw.

Norman J. Henke, Saginaw Malleable Iron Plant, Saginaw.

Frederick Kent, Ass't. Supt., Buick Motor Div., Flint.

Toledo Chapter

Chairman—Emmett E. Thompson, Pattern Supt., Unitcast Corp.,

Vice-Chairman—Harry G. Schwab, Chf. Met., Bunting Brass & Bronze Co.

Secretary-Treasurer—R. C. Van Hellen, Prod. Mgr., Unitcast Corp.

Directors—Terms Expire 1949

A. V. Fromm, Supt., American Brake Shoe Co.

N. P. Mahoney, Supt., Maumee Malleable Castings Co.

Otto H. Schmidt, Pattern Shoe Supt., National Supply Co.

Directors—Terms Expire 1950

Bernard J. Beierla, Met., E. W. Bliss Co., Toledo Machine & Tool Co. Div.

Frank W. Beierla, Pres., Clinton Pattern Works.

Brock L. Pickett, Chf. Insp., Unitcast Corp.

Directors—Terms Expire 1951

John G. Blake, Supt., Alloy Founders, Inc.

Gerald R. Rusk, Sales Rep., Freeman Supply Co., Perrysburg.

Robert H. Zoller, Gen. Mgr., Zoller Casting Co., Bettsville.

Tri-State Chapter

Chairman—Dale Hall, Met., Oklahoma Steel Castings Co., Tulsa.

Vice-Chairman—C. A. McNamara, Jr., Sec'y.-Treas., Big Four Foundry Co., Inc., Tulsa, Okla.

Secretary—D. A. Mitchell, Slsmn., Progressive Brass Mfg. Co., Tulsa, Okla.

Treasurer—R. H. Timberlake, Slsmn., Metal Goods Corp, Tulsa.

Directors—Terms Expire 1949

Fred E. Fogg, Sls. Engr., Acme Foundry & Machine Co., Coffeyville, Kans.

Morris C. Helander, Plant Mgr., Empire Pattern & Foundry Co., Tulsa, Okla.

Directors—Terms Expire 1950

B. P. Glover, Slsmn., M. A. Bell Co., Tulsa, Okla.

Frank R. Westwood, Jr., Brass Fdry. Frm, Service Foundry Co., Wichita, Kans.

Directors—Terms Expire 1951

C. C. Beagle, Fdry. Supt., The Webb Corp., Webb City, Mo.

J. E. Winger, Sec'y.-Treas., Tulsa Iron Works Co, Tulsa, Okla.

Wisconsin Foundry Conducts Student Plant Visitations

The Belle City Malleable Iron Co., Racine, Wis., during recent months has been host to several Wisconsin student groups in a series of plant visitations. Students from the University of Wisconsin's Engineering and Extension Schools, the Milwaukee Vocational School, and Racine's William Horlick high school, after inspecting the plant with company guides, met in the conference room for a question and answer period with representatives of the management. Left: Students of the University of Wisconsin's Extension Division, Racine, lunch in the plant cafeteria as guests of the management. Right: This group of 25 students and their instructor from Horlick High School's Industrial Arts classes inspected the Belle City plant May 26.

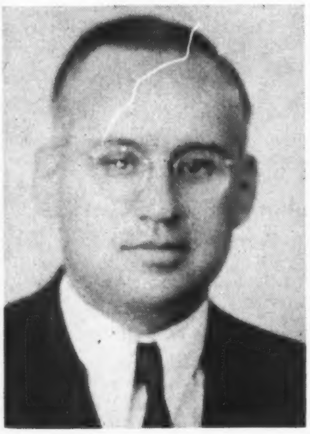
Chapter Officers and Directors

J. T. Gilbert
Stockham Pipe Fittings Co.
Birmingham, Ala.
Director
Birmingham Chapter

R. H. Zoller
Zoller Casting Co.
Bettsville, Ohio
Director
Toledo Chapter

H. L. Mead
John Deere Harvester Works
East Moline, Ill.
Director
Quad City Chapter

E. C. Zirzow
National Malleable & Steel Castings Co. Cleveland, Ohio
President
Northeastern Ohio Chapter



A. Reyburn
Massey-Harris Co., Ltd.
Brantford, Ont.
Director
Ontario Chapter

Oscar Sundstedt
General Foundry Mfg. Co.
Flint, Mich.
Chairman
Saginaw Valley Chapter

H. B. Voorhees
Peru Foundry
Peru, Ind.
Director
Michiana Chapter

W. H. Baer
Naval Research Laboratory
Washington, D.C.
Technical Secretary
Chesapeake Chapter

W. E. Butts
General Metals Corp.
Oakland, Calif.
Director
Northern California Chapter

O. D. Clay
Tuscora Foundry Sand Co.
Canal Fulton, Ohio
Treasurer
Canton District Chapter

C. K. Faunt
Christensen & Olsen Foundry Co.
Chicago, Ill.
Chairman
Chicago Chapter

L. E. Roby, Jr.
Peoria Malleable Castings Co.
Peoria, Ill.
Director
Central Illinois Chapter

New AFS MEMBERS

Period May 15—June 15: Six company members are included in the 156 new members added during this period. Leading chapters of 30 registering gains were: Philadelphia, 24; Detroit, 12; Eastern New York, 11.

NEW COMPANY MEMBERS

Bridesburg Foundry Co., Philadelphia, Pa.—Harry Burgin, Prop. (Philadelphia Chapter).
Foundry Flask & Equipment Co., Northville, Mich.—John A. Weber, Owner (Detroit Chapter).
Illinois Cereal Mills, Inc., Paris, Ill.—F. P. Stone, Asst. to Pres. (Chicago Chapter).
Lake Erie Foundry Co. Inc., Girard, Pa.—R. G. Kibler, Gen. Mgr. & Treas. (Northwestern Pennsylvania Chapter).
Northern Indiana Brass Co., New York Division, South Glens Falls, N.Y.—Lee Martin, Branch Mgr. (Eastern New York Chapter).
Watervliet Iron & Brass Foundry, Inc., Watervliet, N.Y.—John C. Rohleder, Pres. (Eastern New York Chapter).

BIRMINGHAM DISTRICT CHAPTER

S. H. DePriest, Engr., Southeastern Castings Co., Anniston, Ala.
George M. Hayes, Sls., Foundry Service Co., Birmingham, Ala.
W. O. McMahon, Foundry Consultant, Birmingham, Ala.
L. C. Shaw, Jr., C. P. Shaw & Co., Inc., Natchez, Miss.

CANTON DISTRICT CHAPTER

Lauren E. Hexamer, Vice-Pres., U.S. Plug & Fitting Co, Canton, Ohio.

CENTRAL ILLINOIS CHAPTER

Earl F. Brown, Buyer, Caterpillar Tractor Co., Peoria, Ill.
Thomas C. Cunningham, Plant Met., American Brake Shoe Co., Melrose Park, Ill.
Robert E. Dickison, Asst. to Mgr., Brass Foundry Co., Peoria, Ill.
Edgar Earnest, Owner, Pekin Pattern Works, Pekin, Ill.
G. F. Lloyd, Bookkeeper, Brass Foundry Co., Peoria, Ill.
J. R. Nieman, Frm., Caterpillar Tractor Co., Peoria, Ill.

CENTRAL INDIANA CHAPTER

Fred L. Boling, Office Mgr., Gartland Foundry Co., Terre Haute, Ind.
Walter Killion, Frm., Gartland Foundry Co., Terre Haute, Ind.
William Toney, Frm., Swayne, Robinson & Co., Richmond, Ind.
B. E. Turner, Patt. Shop, Frm., National Malleable & Steel Castings Co., Indianapolis, Ind.
Robert A. Zeph, Master Patternmaker, National Malleable & Steel Castings Co. Indianapolis, Ind.

CENTRAL MICHIGAN CHAPTER

Walter A. Bruckner, Molder, Alloy Founders Inc., Toledo, Ohio.
Lachlin Currie, Purch. Agent, Gale Mfg. Co., Albion, Mich.
Maxwell H. Gull, Personnel Asst., Albion Malleable Iron Co., Albion, Mich.

CENTRAL NEW YORK CHAPTER

R. A. Heuerman, Student, Cornell University, Ithaca, N.Y.
Donald W. Piersons, Exec. Mgr., B. Claude Piersons Foundry, Painted Post, N.Y.
Paul L. Widener, Cornell University, Ithaca, N.Y.
Ted H. Wurth, Business Mgr., B. Claude Piersons Foundry, Painted Post, N.Y.

CHESAPEAKE CHAPTER

H. C. Barringer, Sales Repr., American Brake Shoe Co., New York, N.Y.
H. A. Mayberry, Met., Richmond Foundry & Mfg. Co., Richmond, Va.
J. E. Perviance, Foundry Supt., National Advisory Commission for Aeronautics, Va.

CHICAGO CHAPTER

***Illinois Cereal Mills, Inc., Paris, Ill. (F. P. Stone, Asst. to Pres.).**
H. F. Dorsch, Gen. Frm., Grinding, Pettibone Mulliken Corp., Chicago.
William Granat, Treas., Lester B. Knight & Associates, Inc., Chicago.
G. S. Grossman, Owner, Accurate Metal Laboratories, Chicago.
A. W. Johansen, Asst. Dist. Mgr., *The Foundry*, Chicago.
H. W. Maxon, Lester B. Knight & Associates, Inc., Chicago.
S. A. Simonson, Plant Engr., Chicago Hardware Foundry Co, North Chicago.

CINCINNATI DISTRICT CHAPTER

L. M. Anderson, Met. & Sand Tech., The St. Mary's Foundry Co., St. Marys, Ohio.
A. W. Dickens, Student, University of Cincinnati, Cincinnati.
R. P. Elliott, Student, University of Cincinnati, Cincinnati.
R. F. Hafer, Student, University of Cincinnati, Cincinnati.
Arthur Hoffheimer, Jr., Asst. Secy., The Buckeye Products Co., Cincinnati.
E. J. James, Mgr., Castings Sales, Lennox Furnace Foundry Co., Columbus, Ohio.
James D. Voss, Student, University of Cincinnati, Cincinnati.

* Company Members

DETROIT CHAPTER

***Foundry Flask & Equipment Co., Northville, Mich. (John A. Weber, Owner).**
G. Abbott, Pres., Aristo Corp., Detroit.
A. D. Barrett, Fdry. Engineering, General Motors Institute, Clio, Mich.
Cyril DeCook, Asst. Gen. Frm., Budd Co., Detroit.
D. J. Garrett, Core Room Supt., Detroit Gray Iron Foundry Co., Detroit.
N. D. Keklak, Sr. Met Engr, Ford Motor Co, Chemical Engr. Dept., Dearborn, Mich.
M. A. Nelles, Sls., United Steel Supply Corp., Detroit.
A. C. Schroeder, Jr., Foundry Trainee, Wilson Foundry & Machine Co., Pontiac, Mich.
B. J. Stephens, Frm., Wilson Foundry & Machine Co., Pontiac, Mich.
W. E. Sword, Sls., United Steel Supply Corp., Detroit.
J. W. Weber, Sls. Engr., Foundry Flask & Equipment Co., Northville, Mich.
J. J. Wisler, Sls., United Steel Supply Corp., Detroit.

E. CANADA NEWFOUNDLAND CHAPTER

Wm. L. Bond, Prop, Bond Brass Ltd, Eastview, Ont.
D. B. Herbison, Met., Dominion Engineering Co. Ltd., Lachine, Que.

EASTERN NEW YORK CHAPTER

***Northern Indiana Brass Co., New York Division, South Glens Falls, N.Y. (Lee Martin, Branch Mgr.).**
***Watervliet Iron & Brass Foundry, Inc., Watervliet, N.Y. (John C. Rohleder, Pres.).**
H. P. Blumenauer, Jr., Vice-Pres., Albony Castings Co., Inc., Voorheesville, N.Y.
M. H. Binstock, Research Fellow, Rensselaer Polytechnic Institute, Troy, N.Y.
E. A. Chapman, Librarian, Rensselaer Polytechnic Institute, Troy, N.Y.
Roy Curran, Office Mgr. & Purch. Agent, Watervliet Iron & Brass Foundry, Inc., Watervliet, N.Y.
Myers Henderer, Jr., Fdry. Supt., Watervliet Iron & Bass Foundy, Inc., Watervliet, N.Y.
R. D. Malin, Student, Rensselaer Polytechnic Institute, Troy, N.Y.
L. M. Townley, Asst. Met., Adirondack Foundries & Steel, Inc., Watervliet, N.Y.
E. A. Rickey, Industl. Engr., Albany Castings Co., Inc., Voorheesville, N.Y.
A. L. Wildaumes, Asst. to Vice-Pres, Albany Castings Co., Inc., Voorheesville.

METROPOLITAN CHAPTER

Thomas Blake, Jr., Fdry. Frm., Worthington Pump & Machinery Corp., Harrison, N.J.
E. E. Bradway, Vice-Pres., Lester B. Knight & Associates, Inc., New York.
W. W. Criswell, Jr., New York Sales, American Wheelabrator & Equipment Corp., Mishawaka, Ind.
A. S. Dawe, Sales Engr., J. O. Ross Engineering Corp., New York.
Frank L. Roewer, Sales Engr., International Nickel Co. Inc., New York.
Ted Rubin, Met., Apex Smelting Co., Cleveland.
A. M. Watt, Met., Sperry Corp., Sperry Gyroscope Div., Long Island, N.Y.
K. V. Wheeler, Vice-Pres., Wetherill Engineering Co., Philadelphia.

NORTHEASTERN OHIO CHAPTER

C. A. Hartman, Fdry. Engr., Meehanite Metal Corp., Cleveland.
Henry Macler, Gen. Supt., Sterling Foundry Co., Wellington, Ohio.
John Varga, Jr., Student, Case Institute of Technology, Cleveland.

NORTHERN CALIFORNIA CHAPTER

Larry Schultz, Field Engr., California Tramrail Co., San Francisco.

NORTHWESTERN PENNSYLVANIA CHAPTER

***Lake Erie Foundry Co., Inc., Girard, Pa. (R. G. Kibler, Gen. Mgr. & Treas.).**
C. R. Funk, Chief Met., American Locomotive Co., Latrobe, Pa.
L. C. Herrmann, Chief Chemist, American Brake Shoe Co., New York.
Homer Slater, Jr., Salesman, Hewitt Robins Inc., Robins Conveyors Div., Pittsburgh, Pa.

ONTARIO CHAPTER

S. E. Robinson, Fdry. & Pattern Shop Supt., John Bertrams & Sons Ltd., Dundas, Ont.

OREGON CHAPTER

Ray Arnold, Columbia Steel Casting Co. Inc., Portland.
E. J. Bost, Cupola Fore., Rich Mfg. Co. of California, Portland.
J. T. Brodigan, Mgr., Columbia Steel Casting Co. Inc., Portland.
E. H. Buck, Chemist, Rich Mfg. Co. of California, Portland.
J. B. Gouge, Fitting Molder, Rich Mfg. Co. of California, Portland.
J. L. Henderson, Fdry. Supt., Rich Mfg. Co. of California, Portland.
F. H. Steinke, Timekeeper, Rich Mfg. Co. of California, Portland.
O. D. Thompson, Maint. Frm., Rich Mfg. Co. of California, Portland.
L. H. Woodworth, Fitting Molder, Rich Mfg. Co of California, Portland.

PHILADELPHIA CHAPTER

***Bridesburg Foundry Co., Philadelphia. (Harry Burgin, Prop.).**
F. W. Anderson, Dist. Mgr., Precision Grinding Wheel Co., Philadelphia.
C. B. Clipsham, Repr. Sales Engr., S. R. Vanderbeck, Philadelphia.
O. A. Cromwell, Jr., Prop., Oliver Cromwell Co., Philadelphia.

Richard Dawe, Sls., Bridesburg Foundry Co., Fullerton, Pa.
R. C. Enos, Gen. Frm., Fdry. Dept., Pusey & Jones Corp., Wilmington, Del.
W. R. Ferrell, Supt. Patt. Shop, DeLaval Steam Turbine Co., Trenton, N.J.
Abbott Fletcher, Fdry. Trainee, Columbia Malleable Castings Div., Grinnell Corp., Columbia, Pa.
J. A. Jernstrom, Met., The Pusey & Jones Corp., Wilmington, Del.
John Hagenauer, Mgr., Bridesburg Foundry Co., Fullerton, Pa.
R. H. Koch, Res. Engr., United States Pipe & Foundry Co., Burlington, N.J.
R. MacAdam, Asst. Supt, Bridesburg Foundry Co., Fullerton, Pa.
John Medernach, Partner, Medernach & Wood, Fullerton, Pa.
S. F. Morrow, Asst. Molder Frm., Lancaster Malleable Castings Co., Lancaster, Pa.
J. F. Neill, Fdry. Supt., DeLaval Steam Turbine, Trenton, N.J.
C. M. Roller, Frm., Baldwin Locomotive Works, Eddystone, Pa.
W. L. Shearer, Chem. Engr., Bartley Crucible & Refractories Inc., Trenton, N.J.
T. W. Sproull, Res. Asst. in Met., Pennsylvania State College, State College, Pa.
D. M. Thum, Sec. & Treas., Palmyra Foundry Co., Palmyra, N.J.
Edward Toye, Mgr., The Joseph Toye Co., Bridgeton, N.J.
S. R. Vanderbeck, Jr., Sales Engr., S. R. Vanderbeck, Philadelphia.
A. G. Vanderbeck, Sales Engr., S. R. Vanderbeck, Philadelphia.
W. M. Welsh, Asst. Fdry. Frm., Sun Ship Building Co, Chester, Pa.
H. S. Wood, Co-Owner, Medernach & Wood, Fullerton, Pa.

ST. LOUIS DISTRICT CHAPTER

R. L. Edmiston, Supt., Sterling Steel Casting Co., East St. Louis, Ill.
Emil Hart, Mold. Frm., National Bearing Div., American Brake Shoe Co., St. Louis.
Harold Lamont, Consolidated Pattern & Mfg. Co. Inc., St. Louis.
R. J. Tierney, Koppers Company, Inc., Granite City, Ill.

SOUTHERN CALIFORNIA CHAPTER

Joseph Baron, Prod. Engr., Pacific Cast Iron Pipe & Fittings Co., South Gate, Calif.

TENNESSEE CHAPTER

R. A. Cook, Gen. Frm., Wheland Co., Chattanooga.
W. B. Erb, Gen. Fdry. Frm., U.S. Pipe & Foundry Co., Chattanooga.
J. M. Miller, Fdry. Mill Room Frm., Chattanooga Implement & Mfg. Co., Chattanooga.
Mack Towns, Asst. Frm., Crane Enamel Ware Co., Chattanooga.
D. O. Turner, Owner, Turner Clay Products Co., Chattanooga.

TOLEDO CHAPTER

S. D. Dekle, Sls., Ingersoll-Rand Co., Cleveland.

TRI-STATE CHAPTER

M. W. Hartmann, Pres. & Gen. Mgr., M. W. Hartmann Mfg. Co. Inc., Hutchinson, Kans.
W. H. Morse, Secy. & Treas., Morse-Koob, Inc., Wichita, Kans.
W. H. Peck, Oklahoma Steel Castings Inc., Tulsa, Okla.

TWIN CITY CHAPTER

Frank Haselbauer, Patt., American Hoist & Derrick Co., St. Paul, Minn.
R. C. Mack, Patt. Appr., American Hoist & Derrick Co., St. Paul, Minn.
Theodore Schill, Owner, Shield Pattern Works, Minneapolis.

WASHINGTON CHAPTER

W. K. Gibb, Student, University of Washington, Seattle.
G. O. Morken, Sls. & Ser. Engr., Pacific Scientific Co., Seattle.

WESTERN MICHIGAN CHAPTER

H. J. Mitchelson, Asst. Supt. Fdry. No. 5, Lakey Foundry & Machine Co., Muskegon, Mich.

WESTERN NEW YORK CHAPTER

J. M. Clifford, Supt., Bison Castings Inc., Buffalo.
W. H. Gunselman, Gen. Mgr., Non-Ferrous Div., Buffalo Pipe & Foundry Corp., Buffalo.
M. K. Mayo, Owner, National Grinding Wheel Sales Co., Buffalo.
Roy Redmond, Maint. Supv., Central Fdry. Div., General Motors Corp., Lockport, N.Y.

WISCONSIN CHAPTER

B. L. Gray, Jr., Sls. Engr., Macklin Co., Jackson, Mich.
A. L. Imm, Student, University of Wisconsin, Madison, Wis.
O. W. Laabs, Personnel Dir., Universal Foundry Co., Oshkosh, Wis.
F. C. Nilson, Cons. Engr., Bucyrus-Erie Co., South Milwaukee.
A. L. Stanelle, Supt. Foundry, Milwaukee Valve Co., Milwaukee.

STUDENT CHAPTERS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Charles M. Phipps, Jr.

OREGON STATE COLLEGE

Jesse Myles Bell
Anson H. Cleveland
Robert Lindley Knighton
John H. McLean

OUTSIDE OF CHAPTER

Joseph R. Almeida, Westinghouse Electric Corp., E. Springfield, Mass.
E. W. Noon, Troubleshooter, Grinnel Inc., Granston, R.I.

Australia

A. E. Dawkins, Supt., Munitions Supply Laboratories, Victoria.

Cuba

Ildefonso Quesada Jr., Pres., Lamparas Quesada S. A., Infanta y San Lazaro, Havana.

Denmark

Carl E. Jensen, Fdry. Supt. A/S Volund, Oresundsvej 147, Copenhagen.

France

Atiliers & Founderies De Sedan, 40 Avenue De La Marne, Ardennes, France.

Luxembourg

Anthony Boissaux, Engr., Fdry. Supt., ARBED, Dudelange.

Rochester Chapter Sponsors Open House at Paul Revere Trade School

FACILITIES AND TRAINING METHODS of the Paul Revere Trade School's Foundry Department, Rochester, N.Y., were revealed to the public at an open house, held May 27 in cooperation with the Rochester Chapter of the American Foundrymen's Society.

The school's exhibition of its foundry equipment and laboratory facilities for the casting of gray iron, brass, bronze and aluminum drew large crowds.

At a luncheon meeting, held the same day, directors of the Rochester chapter met with V. A. Bird, assistant superintendent of schools; Principal F. O. E. Raab of the Revere Trade School; and H. W. Hershey, instructor in patternmaking and foundry at the school, to discuss cooperation between the school and the Rochester Chapter, ways and means of interesting boys in foundry work, establishment of a cooperative system betwen the school and local foundries, and the giving of foundry instruction to boys majoring in related subjects to broaden their concept.

L. C. Gleason of the Gleason Works, 1947-48 president of the Rochester Chapter, announced that the cooperative efforts between the school and the local foundry industry have proven highly successful in inducing "new blood" to come into the industry.

Hygiene Newsletter for Industry

Industrial Hygiene Newsletter reports health and safety practices in all phases of industry. Issued monthly by the Federal Security Agency, Public Health Service, the publication is for sale by Superintendent of Documents, Government Printing Office, Washington, D.C. Rates are $1.00 a year and $1.25 (foreign).

Future Meetings and Exhibits

Institute of Scrap Iron & Steel, Midyear Meeting, Ambassador Hotel, Atlantic City—July 26-27.

Society of Automotive Engineers, West Coast Meeting, St. Francis Hotel, San Francisco—August 18-20.

American Society of Mechanical Engineers, Fall Meeting, Reed College, Portland, Ore.—September 7-9.

Instrument Society of America, National Instrument Conference and Exhibit, Convention Hall, Philadelphia —September 13-17.

International Foundry Congress and Exhibition, Prague, Czechoslovakia—September 15-19.

National Association of Foremen, 25th Annual Convention, Convention Hall, Philadelphia—September 23-25.

Association of Iron & Steel Engineers, Annual Convention, Public Auditorium, Cleveland—September 28-Oct. 1.

All Canadian Foundry Conference, Montreal, Quebec, Canada—September 30-October 1.

Association Technique de Fonderie, 22nd Annual Congress, Paris, France—October 8-9.

American Society of Tool Engineers, Semi-annual Convention, Pittsburgh—October 10-12.

American Chemical Society, National Exposition, Coliseum, Chicago—October 12-16.

American Society for Metals, 30th Annual National Metal Congress and Exposition, Convention Hall, Philadelphia—October 25-29.

Metals Casting Conference, Purdue University, Lafayette, Indiana—November 4-5.

American Society of Mechanical Engineers, Annual Meeting, Hotels Pennsylvania and New Yorker, New York —November 28-December 3.

American Foundrymen's Society, 53rd Annual Foundry Congress, St. Louis—May 2-5, 1949.

FOUNDRY *Personalities*

Raymond H. Schaefer has been appointed director of Research and Development for the American Brake Shoe Co. Mr. Schaefer started with Brake Shoe in 1940 as assistant foundry metallurgist for the American Manganese Steel Division,

R. H. Schaefer

and became chief metallurgist at the Company's experimental foundry in 1945. AFSMember Schaefer is a graduate of the Carnegie Institute of Technology and a member of the ASTM, the AIMME, the ASM and the IRI.

R. E. Cairns, assistant general manager of the Waukesha Foundry Co., Waukesha, Wis., was recently appointed general manager, succeeding the late Roland F. Smith. Mr. Cairns has been with the company for 12 years. He has been assistant general manager for seven years and treasurer for three years. **Emil H. Howe,** who will continue in his present position as sales manager of the company's pump division, will handle sales promotion work.

Federated Metals Division of the American Smelting & Refining Co. announces the appointment of **Lawrence J. Kauffman,** formerly scrap purchasing agent at its Pittsburgh plant, as assistant manager of operations at Houston, Tex.

Mr. Kauffman joined Federated in 1939 at its Whiting, Ind., plant, and left to join the Army Air Forces. He was assigned to Pittsburgh upon his return from service.

Nathan J. Muskin will succeed Mr. Kauffman as scrap purchasing agent.

A. B. McLaren, service manager of the Perfection Stove Co., Cleveland, has been appointed assistant sales manager of the furnace divisions. Mr. McLaren joined the company in 1930 as a field engineer, and headed the war production section of the company during World War II.

Paul Y. Duffee has been appointed chief engineer of McConway and Torley Corp., Pittsburgh. A graduate of the Carnegie Institute of Technology, Mr. Duffee served as research development engineer at the Lima and Springfield, Ohio, plants of the Ohio Steel Foundry Co. for 16 years. Prior to joining McConway and Torley,

P. Y. Duffee

Mr. Duffee operated the Duffee Engineering Service at Houston, Texas, specializing in the development of machine shop facilities and refining equipment.

James C. Hartley has been appointed vice president, general manager and director of Barium Steel and Forge, Inc., follow-

J. C. Hartley

ing the resignation of **Glenn W. Shetler.** Mr. Hartley joined Barium Steel and Forge in 1946 as chief metallurgist and in 1947 was made manager of Metallurgy and Sales. A graduate of Brooklyn Polytechnic Institute, he entered the Steel industry in 1930 as research assistant for the Crucible Steel Co. of America, and left there to develop the Dolan-Hartley Beryllium Reduction Process. In 1936, he joined Professor Otto H. Henry of Brooklyn Polytechnic Institute in opening a metallurgical consulting office. Prior to joining Barium Steel and Forge, Mr. Hartley was chief metallurgist for Aluminum Forgings, Inc., and director of research for the Heppenstall Co., Pittsburgh.

The appointment of **J. A. Wettergreen** as assistant to the president, Monighan division, Bucyrus-Erie Co., became effective June 1. Located at the Chicago plant,

J. A. Wattergreen

he is associated with **O. J. Martinson,** president of the Monighan division. Mr. Wettergreen was formerly secretary-treasurer of the Eastern New York Chapter.

The appointment of **Glenn C. Merkley** as manager of its industrial products division at Torrance, Calif., is announced by the National Supply Co. Until recently, Mr. Merkley was San Francisco manager.

Dean A. Harrington, former sales representative for the Frontier Bronze Corp., Niagara Falls, N.Y., has been appointed sales manager of the foundry division of the Parker Pattern and Foundry Co., Springfield, Ohio.

Joseph P. Wright, treasurer of the Western Foundry Co., Chicago, was recently elected vice president in charge of sales. He will be succeeded as treasurer by **Frank D. O'Neill,** formerly assistant to the president.

Edward R. Hall, vice president and works manager of the division operating the Bartlett-Hayward plant of Koppers Co., has been appointed vice president and assistant general manager. Simultaneously, it was announced that **Arthur C. Thompson,** superintendent of the Baltimore, Md., plant has been appointed works manager.

James H. Stryker has been appointed executive vice president of the Perkins Glue Co., Lansdale, Pa. Mr. Stryker will retain his position as sales manager of the organization in addition to his new duties. He is a son of the company's co-founder.

John W. Crossett has joined the development and research division of the International Nickel Co., Inc., and will follow railroad development work, succeeding the late Frederick P. Huston.

Mr. Crossett was formerly with the Chicago, Milwaukee, St. Paul and Pacific Railroad as chief metallurgist and assistant engineer of Tests. He is a graduate of the University of Wisconsin.

Dr. George Sachs, director of the Research Laboratory for Mechanical Metallurgy and professor of Physical Metallurgy, Case Institute of Technology, has been appointed director of the National Physical Laboratory, Jamshedpur, India, and will assume his new duties on October 1. The National Metallurgical Laboratory is one of five new governmental research laboratories recently established by the Indian Council for Research and Development, and will cover all aspects of metallurgical research, both fundamental and applied. It will also carry out research work on ores, minerals and refractories and will work closely with the research laboratory of India's Tata Iron and Steel Co. Dr. Sachs has been a member of the Case faculty since 1939, and prior to that directed research and taught in Germany. He has held several executive positions in both the United States and Germany.

George M. Hayes, formerly coordinator of the Foundry division of the Veterans' Training Program at the University of Alabama, has joined the sales staff of the Foundry Service Co., Birmingham, Ala. Mr. Hayes is the author of a book on foundry practice used in schools and colleges throughout the country.

Jan M. Krol, consultant in foundry practice, and **Robert L. Pettibone,** specialist in heat treatment of powder metal parts, announce their affiliation with Sintercast Corporation of America, New York, as chief metallurgical engineer and research metallurgist, respectively. Mr. Krol was educated at the University of Warsaw, Poland, and is the author of several texts on foundry practice. He is consultant for several European firms, including Bofors in Sweden and France's Les Decolletages de Commentry. Mr. Pettibone has studied engineering at four Eastern universities and has specialized in heat treating methods during service with Curtis Wright,

(*Continued on Page 89*)

A.F.A. CHAPTER DIRECTORY

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BIRMINGHAM DISTRICT CHAPTER
Secretary-Treasurer, F. K. Brown, Adams, Rowe & Norman, Inc.

BRITISH COLUMBIA CHAPTER
Secretary-Treasurer, L. P. Young, A-1 Steel & Iron Foundry Ltd.

CANTON DISTRICT CHAPTER
Secretary, J. L. Dickerson, Pitcairn Co., Barberton.

CENTRAL ILLINOIS CHAPTER
Secretary-Treasurer, G. H. Rockwell, Caterpillar Tractor Co.

CENTRAL INDIANA CHAPTER
Secretary, Jack Giddens, International Harvester Co.

CENTRAL MICHIGAN CHAPTER
Secretary-Treasurer, Fitz Coghlin, Jr., Albion Malleable Iron Co.

CENTRAL NEW YORK CHAPTER
Secretary, J. F. Livingston, Crouse- Hinds Co.

CENTRAL OHIO CHAPTER
Secretary, D. E. Krause, Battelle Memorial Institute.

CHESAPEAKE CHAPTER
Secretary-Treasurer, L. H. Denton, Baltimore Convention Bureau.

CHICAGO CHAPTER
Secretary, V. M. Rowell, Velsicol Corp.

CINCINNATI DISTRICT CHAPTER
Secretary, E. F. Kindinger, Williams & Co., Inc.

DETROIT CHAPTER
Secretary, R. E. Cleland, Eastern Clay Products Inc.

EASTERN CANADA AND NEWFOUNDLAND CHAPTER
Secretary, J. G. Hunt, Dominion Engineering Works Ltd.

EASTERN NEW YORK CHAPTER
Secretary-Treasurer, J. A. Wettergreen, General Electric Co.

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Secretary, J. F. Bauer, Hickman, Williams & Co.

MEXICO CITY CHAPTER
Secretary, N. S. Covacevich, Casa Covacevich

MICHIANA CHAPTER
Secretary-Treasurer, V. S. Spears, American Wheelabrator & Equip. Co.

NORTHEASTERN OHIO CHAPTER
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Secretary, J. F. Aicher, E. A. Wilcox Co.

NORTHERN ILLINOIS-SOUTHERN WISCONSIN
Secretary, L. C. Fill, Geo. D. Roper Corp.

NORTHWESTERN PENNSYLVANIA CHAPTER
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ONTARIO CHAPTER
Secretary-Treasurer, G. L. White, Westman Publications Ltd.

OREGON CHAPTER
Secretary-Treasurer, A. B. Holmes, Crawford & Doherty Fdry. Co.

PHILADELPHIA CHAPTER
Secretary-Treasurer, W. B. Coleman, W. B. Coleman & Co.

QUAD CITY CHAPTER
Secretary-Treasurer, C. R. Marthens, Marthens Co.

ROCHESTER CHAPTER
Secretary-Treasurer, L. C. Kimpal, Rochester Gas & Electric Corp.

SAGINAW VALLEY CHAPTER
Secretary-Treasurer, L. L. Clark, General Motors Corp.

ST. LOUIS DISTRICT CHAPTER
Secretary, P. E. Retzlaff, Bush-Sulzer Bros.-Diesel Engrg. Co.

SOUTHERN CALIFORNIA CHAPTER
Secretary, J. E. Wilson, Climax Molybdenum Co.

TENNESSEE CHAPTER
Secretary-Treasurer, A. D. Willis, U. S. Pipe & Foundry Co.

TEXAS CHAPTER
Secretary-Treasurer, H. L. Wren.

TIMBERLINE CHAPTER
Secretary, C. E. Stull, Manufacturers Foundry Corp.

TOLEDO CHAPTER
Secretary-Treasurer, R. H. Van Hellen, Unitcast Corp.

TRI-STATE CHAPTER
Secretary, C. B. Fisher, Enardo Foundry & Mfg. Co.

TWIN CITY CHAPTER
Secretary-Treasurer, L. K. Polzin, Minneapolis Chamber of Commerce.

WASHINGTON CHAPTER
Secretary-Treasurer, A. D. Cummings, Western Foundry Sand Co.

WESTERN MICHIGAN CHAPTER
Secretary, D. A. Paull, Sealed Power Corp.

WESTERN NEW YORK CHAPTER
Secretary, F. L. Weaver, Weaver Materiel Service.

WISCONSIN CHAPTER
Secretary, A. C. Haack, Wisconsin Grey Iron Foundry Co.

STUDENT CHAPTERS 5

UNIVERSITY OF MINNESOTA *Secretary,* Harvey Sauby

MISSOURI SCHOOL OF MINES *Secretary,* Stanley Zirinsky

OHIO STATE UNIVERSITY *Secretary-Treasurer,* Eldon Boner

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Secretary-Treasurer, Martin J. O'Brien

OREGON STATE COLLEGE
Secretary, John P. Meece

CHAPTER ACTIVITIES NEWS

Northwestern Pennsylvania

Earl M. Strick, Jr.
Erie Malleable Iron Co.
Chapter Reporter

THE CLOSING MEETING of the year, held May 24 at the Moose Club, Erie, was attended by more than 100 members and their guests, and featured an address by Frank Steinebach, vice-president of the Penton Publishing Co., on "The Development of the Foundry Industry".

Mr. Steinebach stressed the importance of the industry during the war and cited the confusion that prevailed among the various government agencies in Washington because of their lack of familiarity with the various kinds of metals needed for equipment required by the Armed Forces. He also stated that due to the co-ordination of the various organizations representing the metals industries and the recognition that is today accorded them, much of the confusion would be eliminated in future emergencies.

Mr. Steinebach added that since the war the foundry industry has made great strides in improving its products and in installing modern equipment that has not only made the foundry "a GOOD place to work" but has also increased production with far less effort on the part of the foundry worker. The surface has only been scratched, however, he added, and new ideas and better methods are being developed daily. Mr. Steinebach outlined the problems of the current materials shortage and told what is being done to replace scarce commodities. He commended the efforts of A.F.S. in promulgating information of technical importance and the furtherance of educational programs.

Results of the election of chapter officers were announced and retiring officers were honored for their service to the Chapter during the year.

Directors Fred Eisert, Urick Foundry Co., and Thomas Beaulac, Chicago Pneumatic Tool Co., Franklin, Chapter Reporter and Past Chairman Earl M. Strick, and Past Secretary Harry Gebhardt, United Oil Mfg. Co., received special tributes, as did John Clarke, General Electric Co., for his completion of a successful year as Chairman of the Chapter.

Northeastern Ohio

R. D. Walters
Werner G. Smith Co.
Chapter Secretary

OLD TIMERS' NIGHT, held May 13 at the Cleveland Club, brought out a total attendance of 300, including 94 of the district's old timers. More than a score of the latter had service records in the foundry industry of more than 50 years.

Old Timers' and Apprentices' Night of the Wisconsin Chapter, held may 14 at the Schroeder hotel, Milwaukee, attracted a crowd of almost 500 members and their guests from the foundry and allied industries.

This group of old timers of the foundry industry is a small part of the more than 100 foundry veterans who attended the Wisconsin Chapter's Old Timers' and Apprentices' Night, held in Milwaukee, May 14.

The meeting was also the occasion for honoring the 13 past presidents of the Chapter and for presenting prizes won by three Cleveland winners in the A.F.A. Apprentice Contest. Awarded prizes were John Valichnac, Fulton Foundry & Machine Co., Frank Alabaise, West Steel Casting Co.; and John Coreno, Hill Acme Co.

Results of the annual election of officers and directors were announced, and the remainder of the evening was given over to a program by the Chapter's Entertainment Committee, headed by L. P. Robinson, Werner G. Smith Co.

N. Illinois-S. Wisconsin

C. L. Dahlquist
Greenlee Bros. & Co.
Technical Secretary

THE CHAPTER'S FOURTH ANNUAL "Old Timers' Nite", held at the Beloit Country Club, Beloit, Wis., honored local men who have spent more than 50 years in the foundry industry. The 30 "Old Timers" who received pins in recognition of their years of service to the industry are as follows:

Eli Johnson, John Burstrom, August Wahlborg, Gustave Luebke, Oscar Youngquist and Albert Tobian—all of Greenlee Bros. & Co.

Carl Anderson, Walfred Palm, Pasquale Calacarcio, William Ramlow and G. H. Lundgren of the Mattison Machine Works.

Dan Hallifey, Henry Horn, Hagbert Sorenson and Fred Kruger, of the Beloit Iron Works. John Lonergan, George Crone and Patrick McEntee of the George D. Roper Corp. Roy Schofer and Charles Palmer of Fairbanks, Morse Co. Harry Meyers and Frank Clark of Yates American Machine Co.

Conrad Althans, National Sewing Machine Co.; Levi Hallen, Davey Pump Corp.; Arthur Loennis, Rockford Brass Works; William Gusloff, Woodmanse Mfg. Co.; August Christen, Arcade Mfg. Co.; Albert Budden, Sundstrand Machine Tool Co.; Jack Spearing, J. I. Case Co.; and O. K. Anderson, Gunite Foundries Corp., completed the list of Northern Illinois-Southern Wisconsin foundry veterans.

B. D. Claffey spoke extemporaneously on the subject of "Youth Encouragement" following presentation of the recognition pins to the "Old Timers".

Mr. Claffey stressed the fact that it will require cleaner foundries and more modern equipment to attract the youth of today into the

Present at Northeastern Ohio Chapter's "Old Timers' Night" was veteran foundryman Henry M. Oehling, of the National Malleable & Steel Castings Company, Cleveland.

A few of the foundrymen with over 50 years' service who were honored at the Northern Illinois-Southern Wisconsin Chapter's "Old Timers' Night."

industry. "Put your shop in shape and clean house", Mr. Claffey advised foundrymen, adding that school classes should be invited to view foundries in operation, and that they should be made aware of the romance of the foundry industry, the thrill of accomplishment, leadership, and opportunities that the industry has to offer.

Mr. Claffey paid tribute to George Zabel of the Fairbanks-Morse Co. and Fred Rundquist of Greenlee Bros. & Co. for their readiness in encouraging youth.

Rapid promotions are possible in the foundry, he said. A good foundryman has to be both physically fit and mentally awake to cope with the many and varied problems that arise daily in the foundry. A man does not require a college education to succeed in the foundry industry, according to Mr. Claffey, who stated that there are many men whose circumstances do not permit them to attend college but who would make top-notch foundrymen.

It is a known fact that the average schoolboy frowns upon industrial courses, he said, and the reason for this is that the industry is not put on display sufficiently before the schools of the nation. To remedy this, Mr. Claffey said, industrial leaders should make it a point to address student bodies as often as possible, foundry educational programs should be encouraged, and more scholarships established.

In the foundry itself, a training-advancement shop program can be launched to improve worker-efficiency and, ultimately, the quality of the shop's products. Every man has some valuable ability, Mr. Claffey concluded, and a solid foundry organization can be built by guiding these abilities.

At the Chapter's April meeting, held at the Hotel Freeport, E. C. Hoenicke of the Eaton Manufacturing Co., Detroit, explained the operations of permanent mold machines and their applications to various foundry products.

This group from the Eastern Canada & Newfoundland Chapter was snapped at the Canadian Dinner at the 52nd Annual A.F.A. Convention.

The permanent mold process, Mr. Hoenicke stated, was originally carried on with manually-operated lever-type, single-head machines. Subsequent research resulted in the perfecting of a cam-operated turntable and, finally, in the 12-head, semi-automatic, air-operated machine with rotating molds and suction cooling used today.

Castings produced by the permanent mold process, according to Mr. Hoenicke, are particularly uniform throughout the entire range of section and are free of porosity. This absence of porosity and segregation may be credited primarily to the rapid cooling characteristic of the process. By proper design of molds it is possible to obtain directional controlled solidification.

Users of castings produced in permanent molds, Mr. Hoenicke concluded, have reported that faster speeds and feeds may be employed in machining the castings, thereby lowering machining costs.

Newly-elected officers of the Northwestern Pennsylvania Chapter look on as Retiring Chairman John Clark, General Electric Co., is congratulated on a successful term of office by F. G. Steinebach, Penton Publishing Co. Left to right: Vice Chairman Jos. Shuffstall, National Erie Co.; Mr. Steinebach, Secretary Reginald Harding, Pickands Mather Co.; Mr. Clark; Treasurer Frank Volgstadt, Griswold Manufacturing Co.; and Joseph Hornstein, Meadville Malleable Iron Co., the newly-elected chairman of the Chapter.

Philadelphia

J. L. Furey
Swan-Finch Oil Corp.
Publicity Chairman

THE APRIL MEETING, held at the Engineers' Club, was attended by more than 250 members and their guests, and conducted by Chapter Chairman E. C. Troy. W. Morley, chapter technical chairman, introduced the speaker of the evening, A.F.S. National Director N. J. Dunbeck, Eastern Clay Products Co., Eifort, Ohio.

Mr. Dunbeck's talk covered the entire subject of chemically-coated sands. He spoke on the amount of

research this type of sand entailed, its reactions, uses and mixes and the benefits derived therefrom.

Mr. Dunbeck also explained the extreme care that goes into the conditioning of the sand, its high initial cost as compared with other sands, and the amount of research work still to be accomplished before chemically-coated sand can be considered "fool-proof" and can be used on castings of any size.

An extensive question and answer period followed the address.

Central Ohio

H. W. Lownie, Jr.
Battelle Memorial Institute
Chapter Reporter

THE FINAL MEETING of the current year was attended by more than 120 members and was held at the Chittenden Hotel, May 24.

S. D. Martin and S. W. Healy of the Central Foundry Division, General Motors Corp., Saginaw, Mich., discussed the application of motion study to the foundry industry in a talk enlivened by actual demonstrations of coremaking and light molding operations to show how these processes can be greatly increased in tempo, while at the same time operator fatigue is reduced.

Several operations were shown both before and after the principles of motion study were applied, and the audience was permitted to time the operations to establish the saving in time obtained by the scientifically arranged work sequence.

Outgoing chairman N. L. Peukert (left) hands gavel symbolizing chairmanship of St. Louis Chapter to Incoming Chairman A. L. Hunt at the Chapter's National Officers' Night. Seated at the speakers' table is National President-Elect W. B. Wallis, who spoke on Society aims and policies.

Donald Conto, Michigan Steel Castings Co., talks into a wire recorder operated by W. H. Brown, Hoskins Manufacturing Co., a feature of the Detroit Chapter's public speaking and public relations course.

A major point emphasized by the speakers was the fact that appreciable increases in production can be obtained by small investments in equipment. Scientific study of operations permits the specification of balanced motion paths, shorter motion paths, elimination of tiring body bending, and uninterrupted rhythm. Coupled with simple devices and proper arrangement of the working area, these principles are responsible for greater output at reduced operator fatigue.

Another major point cited by the speakers is that such balanced operations permit a given operation to be done by a wider range of labor, and make it easier to obtain steady workers on the job.

To illustrate the application of these principles in practice in a production foundry, a motion picture showing "before and after" operations at the Saginaw plant of the GM Central Foundry Division was shown. The advantages of planned working sequences and planned work places were strikingly obvious.

The coffee program for the evening consisted of a sound motion picture in color, "Unfinished Rainbows," prepared for the Aluminum Company of America and showing the history of the commercial development of aluminum from the category of a precious metal more expensive than gold to a plentiful industrial material of wide engineering application.

The next Chapter event will be the Annual Outing on August 21.

Ladd Salach, Plastic Corp. of Chicago, shown addressing the May meeting of the St. Louis Chapter.

Tri-State

F. E. Fogg
Acme Foundry & Machine Co.
Publicity Chairman

AN ENTHUSIASTIC CROWD attended the Chapter's first National Officers' meeting, held April 14 in Tulsa, Okla. National President Max Kuniansky was the principal speaker of the evening.

Preceding the regular meeting, Chapter officers and directors met with Mr. Kuniansky at the Foundry Employees' Recreation hall. In the round table discussion, Mr. Kuniansky answered the questions put to him by the officers and directors

Officers of the Northeastern Ohio Chapter at the speakers' table at the Chapter's "Old Timers' Night" are, left to right, Retiring President H. G. Gollmar, Elyria Foundry; Treasurer F. R. Flieg, Smith Facing & Supply Co.; President-Elect E. C. Zirzow, National Malleable & Steel Castings Co.; Vice-President-Elect W. E. Sicha, Aluminum Company of America; and Chapter Secretary R. D. Walter, of the Werner G. Smith Co.

of this comparatively new chapter. In this connection, he pointed out the importance of strong technical and educational programs to chapter growth.

The regular meeting program was arranged by Dale Hall, Oklahoma Steel Castings Co., who introduced President Kuniansky. Mr. Kuniansky discussed general foundry operations. Following the talk there was a lively and interesting question and answer period.

Eastern New York

D. B. Slater
General Electric Co.
Publicity Chairman

W. B. George, R. Lavin & Sons, Chicago, was the guest speaker at the April 20 meeting and spoke on "Non-Ferrous Foundry Practice." National President-Elect William B. Wallis was present at the meeting and spoke on the aims and policies of the A.F.S.

Ninety members and guests attended the dinner, presided over by Alexander C. Andrew, American Locomotive Co., Chapter vice chairman, in the absence of Chapter Chairman C. E. Killmer.

After Chapter Secretary J. A. Wettergreen made his report, the various committee chairmen—Robert Wicks, Membership; Chester Richards, Educational; Charles Blumenauer, Nomination; and Daniel Slater, Publicity—spoke briefly on plans for the coming year.

Vaughn Reid, Jr., City Pattern Works, Detroit, will be the speaker at the May meeting. The nominating committee will have the roster of officers and directors for consideration at the meeting. Elections will be held June 15.

Canton District

N. E. Moore
Wadsworth Testing Laboratory
Chapter Reporter

National Officers' Night was observed at the Swiss Club, April 8, with more than 100 members present. A.F.S. National President-Elect William B. Wallis reported on the activities of the Association at the dinner meeting, after having previously conferred with the Chapter's officers and directors.

Speaking on "Foundry Modernization," L. E. Everett, vice president, Lester B. Knight & Associates, Inc., Chicago, told his audience that the modernization of the foundry industry meant not only installation of modern equipment, but also proper organization of management, and control over its phases of manufacturing.

Mr. Everett added that business organization is the greatest factor in an efficiently operated plant.

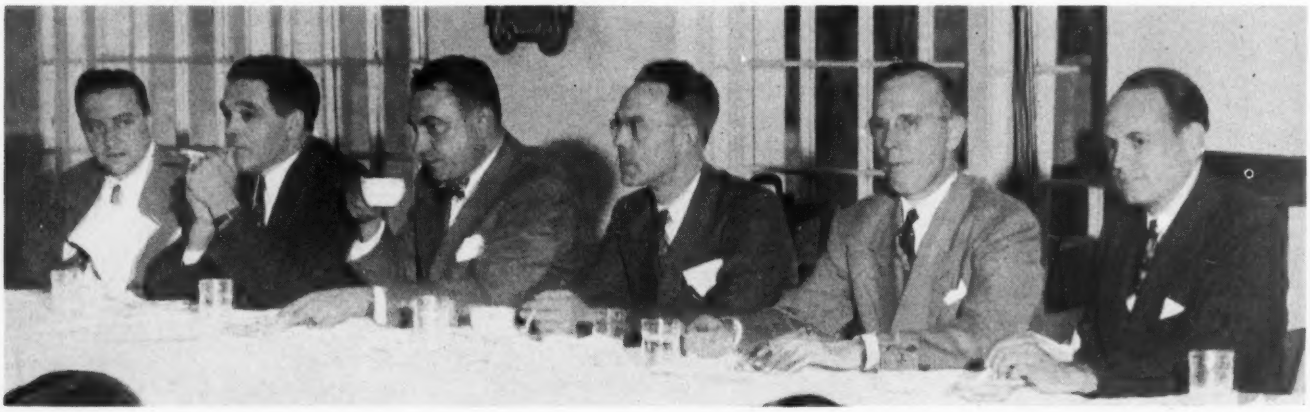
Rochester

G. M. Etherington
Gleason Works
Chapter Reporter

The evening of April 13 was, in effect, patternmakers' night when the Chapter met at the Hotel Seneca. In keeping with the occasion, the guest speaker, C. R. Simmons, Durez Plastic and Chemicals, Inc., spoke on "Plastic Patternmaking."

(Continued on Page 82)

Seated at the speakers' table at the May 24 meeting of the Central Ohio Chapter are, left to right: T. W. Payne, Summer & Co.; Chapter Treasurer W. T. Bland, Commercial Steel Casting Co.; Guest Speaker S. W. Healy, General Motors Corp.; Retiring Chapter Chairman Ray Frank, Bonney-Floyd Co.; Co-Speaker S. W. Martin, General Motors Corp.; Incoming Chairman Fred W. Fuller, National Engineering Co.



NEW Foundry Products

Readers interested in obtaining additional information on items described in New Foundry Products should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the items by means of the convenient code numbers.

Spray Dispensers

JL1—A new series of spray dispensers with aluminum tanks, to be used to combat athlete's foot in industries, is now available from Peda Spray Co., Inc. The dispenser ejects a fine solution-mist to the feet, affording a complete individual application to the user. Spray solution, contained within a fully enclosed tank, cannot be diluted or contaminated by previous users. Solution requires no changing, despite from 12,000 to 16,000 applications from a single filling of the tank.

Core Oven

JL2—An economy oven available for production baking in a small foundry and for auxiliary equipment in large operations, the Core King Oven, manufactured by the Despatch Oven Co., is ideal for small cores in quick bakes of an hour or less, thus freeing space in ovens for longer

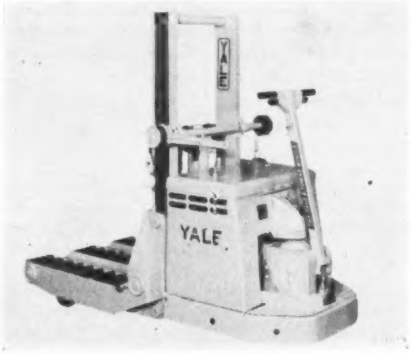
bakes. Also accommodates large cores, rush jobs, drying and pasting. Forced convection, gas-fired, forced exhaust, automatic safety and temperature controls—preset for any temperature up to 450 F. Two to six shelves in two openings 24x36x30 in. in Junior model, which occupies 16 sq ft of floor space. Senior model consists of two complete Junior models engineered into one cabinet, with partition. Shipped complete and assembled, requiring only attachment of gas line and plugging into 110 volt outlet.

Portable Potentiometer

JL3—A portable potentiometer for precise measurements of very low voltages is announced by General Electric Co. Designed originally for measuring low voltages of thermocouple outputs in testing steam turbines, the potentiometer will check temperature-measurement instruments, and test rotating machines, ovens, furnaces, steam-driven equipment and air conditioning units. Equipment, contained in a durable luggage case, includes galvanometer, standard cell, working batteries and rheostats for adjusting current.

Loading Truck

JL4—A heavy-duty loading truck for heavy dies and molds, Yale & Towne's 4000 lb capacity, electric "Walkie" picks up the die or mold at the storage zone,



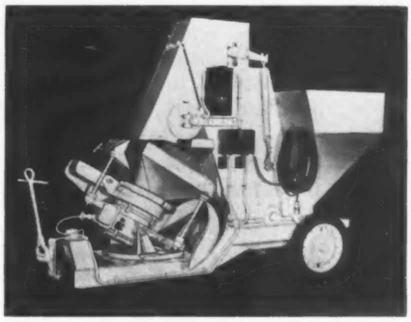
transports it to the press, lifts it level with the lower platen of the press and mechanically loads it into position for use. High lift feature of the truck makes it possible to take molds and dies from storage racks of different heights and to load and unload presses of different types. Can also be used to advantage in handling heavy machinery and parts and in unloading heavy cases from street trucks. Small dimensions of the truck adapt it to congested aisles.

Temperature Control

JL5—A temperature controller utilizing a single electronic tube with electrical resistance bulb for thermal pick-up has been developed by Thomas A. Edison, Inc. This non-indicating device may be used to control temperatures to close tolerances in solids, liquids or gases, and is available to cover temperature ranges from 100 F to 1200 F and can be adjusted within a range of several hundred degrees. A control panel is provided with conduit knockouts and terminal board and may be located at any convenient place throughout the foundry.

Portable Nite-Gang

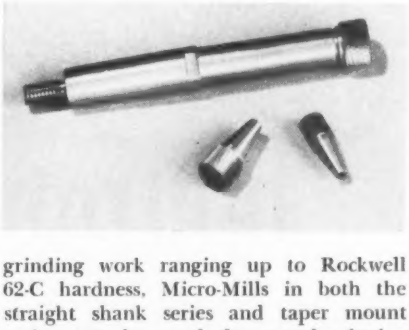
JL6—A portable sand preparation unit for the small foundry eliminates hand shoveling and provides magnetic separation, through screening and aeration of molding sand. Machine may be pulled or pushed to any floor in the foundry and plugged into a convenient receptacle. Hopper can then be loaded with up to 3/4 cu yd of shakeout sand. Bucket elevator



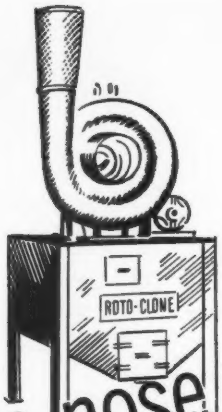
raises the sand, discharges it over magnetic separator, drops it into Screenarator unit for screening, aeration, and discharges it at a rate of 20 tons per hr, anywhere within a radius of 25 ft and 160 degrees. Will discharge into a heap, windrow, or container while operator is preparing another load. Screenarator swings to either side of Nite-Gang for discharging. Manufactured by Beardsley & Piper.

Micro-Mills

JL7—Micro-Mills for speedy internal finishing are now available in sizes 3/8 in. or larger from the Severance Tool Industries, Inc. Standard internal grinding spindles or quills can be adapted for the mounting of Micro-Mills with instant alignment. Bores can be sized in one or two passes and in a fraction of the time consumed by internal grinding. Besides qualifying for the ordinary run of internal



grinding work ranging up to Rockwell 62-C hardness, Micro-Mills in both the straight shank series and taper mount series can be used for post-hardening changes or alterations where large amounts of stock removal are involved. Micro-Mills may be reground at a small cost.


ROTO-CLONE

CHAPTER ACTIVITIES

(Continued from Page 78)

Illustrating his talk by actually casting two small patterns, Mr. Simmons dealt with the liquid phenolic type of casting resins. Proper proportioning of plastic and accelerator, proper mixing and proper aging are the essentials of making a good plastic reproduction, Mr. Simmons said. Plastic, wood, metal or a flexible material are all suitable for forming the mold cavity for the plastic pattern.

Ease of duplication, ease of changing and patching and low cost make this plastic a promising material.

A series of slides illustrating the use of the plastic casting resin accompanied the talk. The program concluded with a discussion period.

E. Canada & Newfoundland

H. E. Francis
Jenkins Bros., Ltd.
Publicity Chairman

Speaking on "Gates and Risers to Make Sound Castings" at the meeting held April 9 at the Mount Royal hotel, Montreal, H. C. Winte of Motor Castings Co., Milwaukee, said that the one underlying principle for producing sound castings is controlled progressive solidification. He added that gating, risering, and pouring of castings should be done in such a manner as to fulfil that principle.

Mr. Winte demonstrated proper and improper uses of the "bob gate" by means of lantern slides. This is the best type of gate to eliminate shrinkage, Mr. Winte stated, when gating several patterns of the same type on a plate.

A. E. Cartwright, Crane, Ltd., presided at the meeting and J. H. Newman, Newman Foundry Supply, Ltd., introduced the speaker.

Nominating Committee Chairman R. E. Cameron, Webster & Sons, Ltd., announced nomination of the following roster of officers and directors for the coming year:

Chairman, O. L. Voisard, Robert Mitchell Co., Ltd.; *vice chairman,* James Newman, Newman Foundry Supply, Ltd.; *secretary,* J. G. Hunt, Dominion Engineering Works, Ltd.; *treasurer,* L. Guilmette, Canadian Foundry Supply & Equipment; *immediate past chairman,* A. E. Cartwright, Crane, Ltd.

Directors (*for one year*): H. E. Francis, Jenkins Bros., Ltd.; (*for*

(Continued on Page 84)

Burned-out cores that collapse like a house of cards

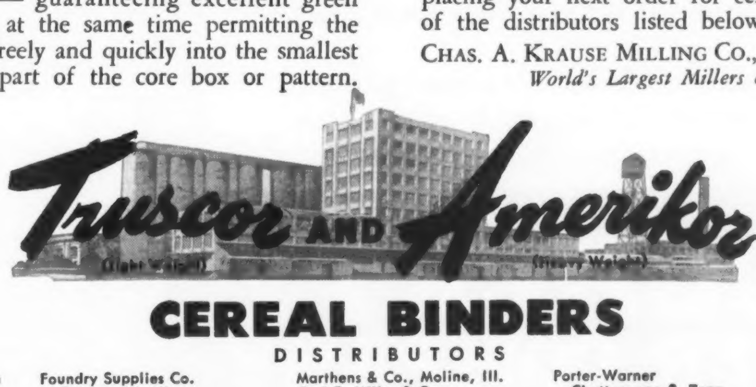
Krause Cereal Binders—TRUSCOR (light weight) and AMERIKOR (heavy weight) contribute green strength to the core before baking, dry strength to the core after baking, and collapsibility to the core after casting.

Both cereal binders develop a strong affinity between the sand granuals — guaranteeing excellent green strength — while at the same time permitting the sand mix to flow freely and quickly into the smallest and most remote part of the core box or pattern.

Then when a Krause cereal binder core is placed in the mold and the casting is being poured — this same cereal binder burns out rapidly and completely, insuring ready collapsibility and easy shake out.

So why not take advantage of all these benefits by placing your next order for cereal binder with one of the distributors listed below, or with us direct.

CHAS. A. KRAUSE MILLING CO., MILWAUKEE 1, WIS.
World's Largest Millers of Dry Corn



CEREAL BINDERS

DISTRIBUTORS

M. A. Bell Co., 3430 Brighton Blvd., Denver, Colo.
M. A. Bell Co., 401 Velasco St. Houston, Texas
M. A. Bell Co., St. Louis 2, Mo.
A. L. Cavedo & Son, Inc. Richmond 21, Va.
Foundry Supplies Co. Chicago 16, Ill.
J. H. Hatten, Lansdowne, Pa.
Independent Foundry Supply Co., Los Angeles 11, Calif.
Joseph B. Meier, 96 N. 18th St., East Orange, N. J.
Marthens & Co., Moline, Ill.
Carl F. Miller & Co. Seattle 4, Wash.
Milwaukee Chaplet & Mfg. Co., Milwaukee 4, Wis.
Pacific Graphite Works Oakland 8, Calif.
Porter-Warner Chattanooga 2, Tenn.
Smith-Sharpe Co. Minneapolis 14, Minn.
Frederic B. Stevens, Inc. Buffalo 12, N. Y.
Frederic B. Stevens, Inc. Cleveland 14, Ohio
Frederic B. Stevens, Inc. Detroit 26, Mich.
Western Industrial Supply Co. 208 S. E. Hawthorne Blvd. Portland 14, Oregon

CHAPTER ACTIVITIES

(Continued from Page 82)

three years) : A. J. Moore, Canadian Bronze Co., Ltd; J. E. Roberge, Hardware & Woodenware, Inc.; H. T. Doran, Whiting Corp. (Canada) Ltd.; Alex Watson, Canadian National railways; and Lucien Beaudry, Warden King, Ltd.

New England

Merton A. Hosmer
Hunt-Spiller Mfg. Co.
Association Reporter

THE REGULAR MEETING was held at the Engineers' Club, Boston, with more than 100 members and guests present. James P. Moran, Research Engineer, Induction Heating Corp., Brooklyn, N.Y., addressed the group on "Dielectric Core Baking."

Mr. Moran made cost comparisons on operations and sand mixtures and outlined the rapid progress made during the last year on this new core baking method. He covered such points as: green handling, shakeout, collapsibility, negligible gassing, uniformity of core, use of plastic dryers, core room yield, and the impossibility of overbaking with dielectric method.

Average, small and medium-sized cores are cured dielectrically in two or three minutes, he said, as compared with the three or four hours required by other baking methods. The conveyor equipment used permits cores to be placed on a belt by the coremaker, pass through the heating electrodes, and emerge at the opposite end of the tunnel ready for use. The process eliminates the labor usually required to load and unload racks, and thus reduces core costs. Less space is also required. Another advantage stressed by Mr. Moran is the reduction in core mixes for overall production of the foundry. The talk was illustrated and Mr. Moran exhibited several dielectrically baked cores.

The second portion of the program featured a talk by Frank W. Curtis, development engineer, Induction Heating Corp., on "Hardening of Cast Iron by Induction Heat to Eliminate Chills."

Mr. Curtis displayed several samples and outlined the process used in one plant, which hardens over two million pieces annually at a substantial saving over previously-used methods. More than 700 parts

(Continued on Page 86)

CHAPTER ACTIVITIES

(Continued from Page 84)

are handled in the plant, he said, and the equipment is flexible enough to handle relatively low-lot runs of 25 or 50 pieces, although the usual run comprises from 400 to 500 pieces.

Northeastern Ohio

R. H. Herrmann
Penton Publishing Co.
Chapter Reporter

LOCAL APPRENTICE CONTEST winners were awarded prizes at the April 8 meeting of the Chapter, held at the Cleveland Club, Cleveland.

Winners of the local contest are:

Gray Iron Division: *(first prize)* John Valichnac, Fulton Foundry & Machine Co.; *(second)* John Coreno, *(third)* Albert Pucillo, both of Hill Acme Co.

Pattern Manufacturers group: *(first)* Howard Rand, Aluminum Co. of America; *(second)* Louis Jurkiewicz, Modern Pattern Co.; and *(third)* Carl Eppich, Standard Pattern Works.

Non-Ferrous Division: *(first)* Elmer J. Turk, Wellman Bronze & Aluminum Co.; *(second)* Paul Kuchas and *(third)* Andrew Gerda, both of Cleveland Trade School.

Steel Division: *(first, second and third, respectively)* Frank Alabaise, Edward Podnar and Nick Kraynak, all of West Steel Castings Co.

Dean Clement J. Freund of the College of Engineering, University of Detroit, addressed the meeting on the opportunities available for young men of today in the foundry industry. Dean Freund stressed the fact that not enough young men have chosen the foundry as a career in the past. Consequently, he said, there exists a shortage of adequately trained young men in the industry today.

The way to remedy this situation, Dean Freund pointed out, is to stimulate interest in the foundry industry by means of intensive research and progressive thinking on the part of management and supervisory personnel. He predicted that the foundry industry will have a boom in the near future and that this boom will have been caused by research and progressive thinking.

In speaking on "Apprentice Training in the Foundry," William

(Continued on Page 88)


UNIQUE
DUST CONTROL
HOOD...
SAVES SPACE
GIVES BETTER LIGHT!!

CHAPTER ACTIVITIES

(*Continued from Page 86*)

J. Moore, assistant director of the Apprentice Training Service of the United States Department of Labor, outlined the purpose and plans of his organization, which has been instrumental in formulating basic apprentice training standards—particularly with reference to wages, school instruction, supervision and terms of apprenticeship.

Officer and director nominations announced for 1948-49 are:

President, E. C. Zirzow, National Malleable & Steel Castings Co.; *vice president,* Walter E. Sicha, Aluminum Co. of America; *secretary,* Robert D. Walter, Werner G. Smith Co.; and *treasurer,* F. Ray Fleig, Smith Facing & Supply Co.

Directors (terms expire 1951): Lewis T. Crosby, Sterling Wheelbarrow Co.; Maurice F. Degley, Ferro Machine & Foundry Co.; Henry C. LeBeau, Ohio Injector Co.; Lloyd W. Leeseberg, Superior Foundry, Inc.; and John Sharrits, Westinghouse Electric Corp.

F. L. Barton, Fulton Foundry & Machine Co., was nominated to fill the unexpired term of Walter E. Sicha, vice presidential nominee.

Quad City

C. R. Marthens
Marthens Co.
Secretary-Treasurer

T. R. Gauthier, Aluminum Company of America, was the guest speaker at the April 19 meeting, held at the Fort Armstrong hotel, Rock Island, Ill.

Mr. Gauthier illustrated his talk with a sound film, "This is Aluminum," describing the mining, processing and uses of aluminum.

There are three general methods of casting aluminum, Mr. Gauthier stated—sand casting, die casting, and permanent mold casting—and pointed out that there has been a decided increase in the production of permanent mold castings, and a decrease in the use of sand castings within the last two years. He also described the uses of various alloy materials with aluminum.

Past National President H. Bornstein conducted the technical session and discussion. Chapter Chairman R. H. Swartz, presided.

The nominating committee concluded the meeting by submiting a roster of officer nominees for the 1948-49 fiscal year.

PERSONALITIES

(Continued from Page 73)

Springfield Heat Treating Corp. and Precision Metal Products Co., and in his own consulting firm, Lane Engineering.

John L. Lowe has been appointed plant manager and **James F. Duffy** treasurer of the Chicago Foundry Co., according to an announcement by President R. I. Wells. Mr. Lowe was formerly associated with Campbell, Wyant and Cannon, Pontiac Motors, and Battelle Memorial Institute. Mr. Duffy has been comptroller of the Company for several years.

Verne O. McClurg, partner in the Chicago architectural and engineering firm of Mundie, Jensen and McClurg, was recently installed as president of the Western Society of Engineers at the Society's annual meeting in Chicago. Other officers elected include: *first vice president,* **Gustav Egloff,** research director, Universal Oil Products Co.: *second vice president,* **H. P. Sedwick,** vice president, Public Service Company of Northern Illinois; *treasurer,* **M. P. Vore, Jr.,** secretary-treasurer, Republic Flow Meters Co.; *trustees:* **Wilfred Sykes,** president, Inland Steel Co., and **Fred T. Whiting,** vice president, Westinghouse Electric Corp.

OBITUARIES

F. J. Cook, 77, a founder member of the Institute of British Foundrymen and twice president of that organization, in 1908 and 1909, died April 5. Mr. Cook was the first recipient of the IBF's Oliver Stubbs Medal, in 1922, and for many years took an active part in all phases of Institute affairs. He was elected an Honorary Life Member of the IBF in 1932 in recognition of his long and prominent services in Institute executive capacities. Known as the "father" of the IBF, Mr. Cook was also prominent in the affairs of the British Cast Iron Research Association from the time of its inception.

William J. Muhlitner, 56, president, Great Lakes Foundry Sand Co., Detroit died at his home in that city May 11, following a prolonged illness. Mr. Muhlitner became a timekeeper at the Detroit Stoker & Foundry Co. in 1909, and in 1915 was appointed assistant manager of the Foundry Machine Products Co. In 1920, Mr. Muhlitner was made vice president and general manager of the newly-formed Great Lakes Distributing Co., which later became the Great Lakes Foundry Sand Co. He was elected president of the company in 1941. Mr. Muhlitner was a member of the American Foundrymen's Association and the American Ceramic Society, and was a director of the National Industrial Sand Association.

Robert E. Wendt, 73, instructor in foundry practice at Purdue university for 35 years, died in Lafayette, Ind., March 31. Prior to his association with Purdue university, Mr. Wendt was with the Rumely Co., LaPorte, Ind., from 1891 to 1910, with the exception of one year spent with the Mueller Brass Works. He was appointed instructor at Purdue in 1910 and remained in that capacity until 1945. Mr. Wendt was the author of many technical articles appearing in foundry publications and was the author of a textbook on foundry work. He was a member of the American Foundrymen's Association.

Melville E. Kohler, Sr., 51, vice president in charge of sales for the Scientific Cast Products Corp., Cleveland, died in Philadelphia May 7 while attending the A.F.A. Foundry Congress. Mr. Kohler had been with the company since 1923.

Jesse M. Darke, a charter and Honorary Life Member of the American Foundrymen's Association, died April 1 at his home in Lynn, Mass. One of America's pioneers in metallurgy, Mr. Darke trained many of today's leaders in the metallurgy and foundry fields. He promoted the first specification for tool steel in the United States and was active in the development of manganese steels and of chrome type stainless steels. Mr. Darke was responsible for many important metallurgical contributions to the development of the safety razor, and later organized the first of General Electric Company's many laboratories. Mr. Darke was a member of the A.F.A., the ASM and the ASTM.

BOOK REVIEW

Ferrous Metallurgical Design, by John H. Hollomon, and Leonard J. Jaffe. x,246pp. Price $5.00. Published by John Wiley & Sons, Inc., N.Y. (1947).

Principles and data pertinent to the problem of metallurgical design of steel parts for best mechanical properties are presented in *Ferrous Metallurgical Design.*

The microstructure of steel determines the success of the finished product. Therefore the design engineer must consider the various properties of the metal in order to produce the best design for the part required. To do this he must obtain a steel of uniform composition throughout the steel part, know the shape, mechanical properties, composition and heat treatment as these are interrelated.

These will aid in the selection of steel parts for which the best combination of mechanical properties is required since each application calls for different combinations.

The first three chapters deal with phase transformations, heat flow during heat treatment, and mechanical behavior of metals. The next chapter on mechanical properties begins the applications of principles to available data.

Ensuing chapters carry out the applications of principles. The fact that quenching media is based on heat flow, and hardenability on chemical composition, is brought out. Methods for minimizing quench-cracking are pointed out and tempering to reduce quenching stresses is discussed.

In the last two chapters a specific application is carried through—choosing first a quenching procedure suitable for the shape to be heat-treated; next hardenability required to harden the piece is estimated. The carbon content is selected tentatively as well as the percentages of the various alloying elements. The piece is then heat-treated and tested for hardening and freedom from brittleness. The service tests and process control procedures can then be established.

Suggested readings appear at the end of each chapter and an extensive bibliography is included at the end of the text.

NEW FOUNDRY LITERATURE

Readers interested in obtaining additional information on items described in Foundry Literature should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the items by means of the convenient code numbers.

JL100—A four-page, illustrated pamphlet describing the combined facilities of the Hunt laboratories is now available from Robert W. Hunt Co., Engineers. Described are complete chemical, physical and metallurgical services offered by the organization to purchasers and manufacturers of engineering materials, for the testing of purchases, improvement of product and control of operations.

JL101—Now available to interested readers are copies of a typical survey report made for a client by John A. Patton, Management Engineers, Inc. The report, dealing with one of the many phases of business management and operation covered by this organization, has as its subject "Wage Payment Survey" and outlines several conditions contributing to excessive manufacturing costs in a particular plant. A detailed analysis of working conditions in the plant is given, together with recommendations for their improvement.

JL102—Advantages of induction heating in the form of increased production and lower processing costs are covered in a 12-page bulletin describing Allis-Chalmers heaters ranging from 1 to 100 kw in sizes. The bulletin presents several dozen examples of successful brazing, soldering, hardening, annealing and heating with induction heaters involving a wide diversity of products from refrigerator and automobile to industrial stitching machine parts. Allis-Chalmers special engineering services are listed, and heater specifications and dimensions are given.

JL103—"7 Profitable Ways to Utilize Buckeye Silica Firestone" is the title of a new booklet published by the Cleveland Quarries Co. Featured usages of the stone, as listed in the four-page illustrated pamphlet are: cupola blocks, cupola liners, split rock linings, split rock patching, slag hole blocks, ground silica firestone and hearth bottom stone. Also included are suggestions for laying up firestone successfully in the melting area.

JL104—A six-page, two-color circular with illustrations describes in detail the functions and scope of Buckner Process Co.'s "Lion Paw" brand conveyor belting, transmission belting and safety matting. The circular reveals how an improved impregnation process provides infinitely longer life, compared to ordinary transmission or conveyor belting. Industrial applications are shown by line drawings.

JL105—A reprint of an article appearing in *Blast Furnace and Steel Plant*, *"Oxygen in the Steel Industry—Past Present and Future"*, by G. V. Slottman, technical assistant to the vice-president, Air Reduction Sales Co., is now available from that organization without charge. The article provides data on oxygen uses in the steel industry, including the development phase, combustion and metallurgical uses, and concludes with a summary of open hearth uses of oxygen.

JL106—A bulletin describing the properties and uses of a primerless, air-drying coating, LC-600, suitable for use in tanks and pipe fittings has been published by the Lithgow Corp. Properties of LC-600 described include: resistance to acids, alkalies, chlorides, oils, salts, oxygen and alcohol solutions; non-oxidizing, non-deteriorating, odorless and electro-chemical corrosion resistance.

JL107—A four-page circular, *"Engineering Opportunities in the Applications of Cerium Metal"*, written by R. F. Marande, metallurgical engineer, is available from General Cerium Co. The article outlines the uses of cerium in ferrous metallurgy, copper, nickel, zinc, aluminum and magnesium alloys. A comprehensive bibliography dealing with the subject is given at the conclusion of the paper.

Index to Advertisers

FIRM FACTS

Kaiser-Frazer Corp.'s Dowagiac, Mich., foundry, closed for two months for inventory adjustment and installation of new equipment, reopened May 10. New equipment installed includes a cooling chain to handle castings from foundry to cleaning department, a vertical core oven and sand muller, and two Speedmullors. The old building has been dismantled.

Leonard Foundry, Osterville, Mass., closed since the War, was recently purchased by Holland and William E. Bennett, and reopened May 10 as the **Cape Cod Foundry Co.** William Bennett will serve as president of the new company and Holland Bennett as treasurer.

Wayne Foundry & Stamping Co. is the new name of the Wayne Foundry Co., Detroit. Short run stamping operations have been added to the company's facilities.

A newly-developed X-ray metals analysis unit will receive its first commercial use shortly at the Beaver Falls, Pa., plant of the **Babcock & Wilcox Co.** The first of five units to be constructed, the fluorescence analysis unit will facilitate rapid nondestructive testing of the constituents of metals, alloys, chemicals, and ores.

Acheson Foundry & Machine Works, Chattanooga Tenn., was recently purchased by the Reconstruction Finance Corporation at an auction held April 23 to satisfy an indebtedness to the RFC.

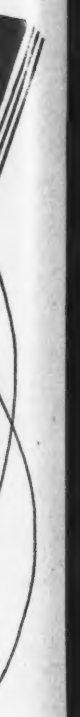
H. C. Macaulay Foundry, Berkeley, Calif., is doing a "roaring" business in engine castings for midget racing automobiles. According to Manager H. A. Bossi, the foundry is turning out midget motor castings 100 at a time.

Battelle Memorial Institute's Production Engineering Laboratory was moved from the World Theater Bldg., Columbus, last month to larger quarters at 2560 North High St.

Nearly 23 tons of scrap were collected in a scrap drive conducted by the **Gear Grinding Machine Co.** of Detroit last month. Prizes of United States Savings Bonds were awarded employees bringing in the greatest amount of scrap. Proceeds were given to the American Red Cross.

A permit for the construction of a $70,000 two-story foundry building in Dayton, O., was recently awarded the **Master Electric Co.** of that city. The Company produces its own castings for use in manufacturing electrical equipment.

General Steel Castings Co. recently announced that it has eliminated interlocking directorates between itself and two stockholder companies, **Baldwin Locomotive Works and American Steel Foundries,** in conformation with a Department of Justice request.



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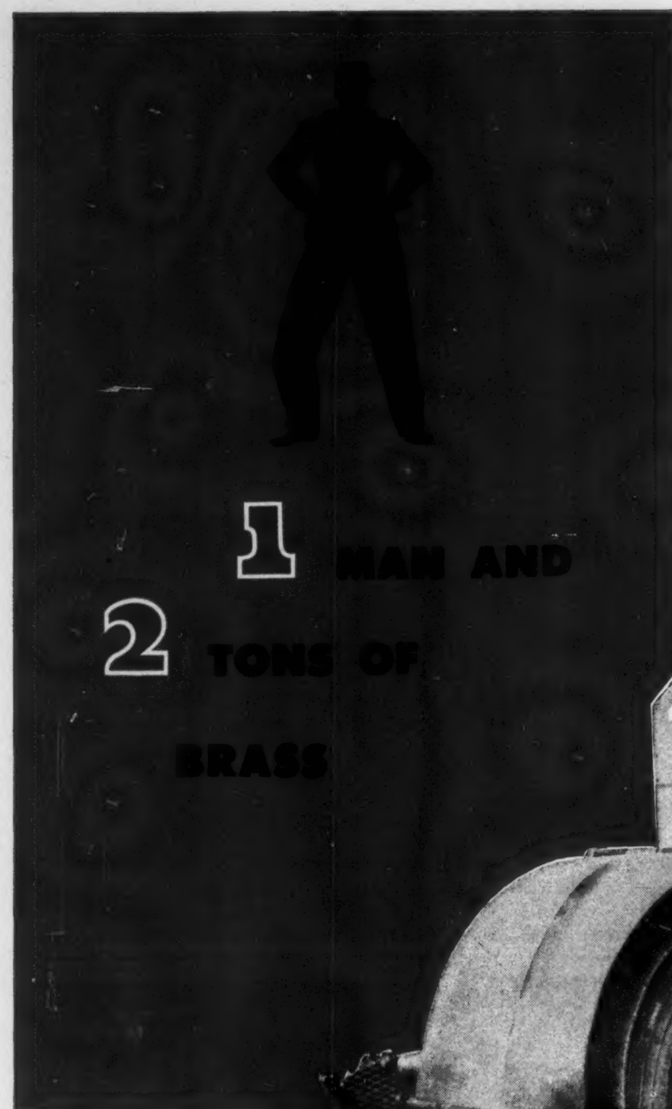

Talk about fast metal melting at low cost!—the Type LF, 200 lb. DETROIT ROCKING ELECTRIC FURNACE illustrated below melted more than *two tons of red brass in one day's typical operation by one man.* In just 9 hours, this small and compact unit melted 27 heats of leaded bronze—200 lbs. per heat—for a total of 5400 lbs. *Power consumption, only 281 Kwh per ton.* Simple DETROIT ELECTRIC FURNACE design makes one-man operation easy. Non-rotating electrodes, supported by brackets mounted on the base, receive power from either overhead or below via copper conductors. Withdrawing electrodes frees shell for easy interchange to permit melting heats of various analyses. All controls are at operator's fingertips, assuring quick, positive regulation of melting time, composition, and other melting factors. Send us your ferrous and non-ferrous metal melting requirements. We will recommend the specific DETROIT ELECTRIC FURNACE—available in 10 lb. to 8000 lb. capacities—to speed quality metal production in your plant.

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